Mail Application To:		**For Department use only:**
New Mexico Environment Department Air Quality Bureau Permits Section 525 Camino de los Marquez, Suite 1 Santa Fe, New Mexico, 87505 Phone: (505) 476-4300 Fax: (505) 476-4375 www.env.nm.gov/aqb		AIRS No.:

Universal Air Quality Permit Application

Use this application for NOI, NSR, or Title V sources.

Use this application for: the initial application, modifications, technical revisions, and renewals. For technical revisions, complete Sections, 1-A, 1-B, 2-E, 3, 9 and any other sections that are relevant to the requested action; coordination with the Air Quality Bureau permit staff prior to submittal is encouraged to clarify submittal requirements and to determine if more or less than these sections of the application are needed. Use this application for streamline permits as well. For NOI applications, submit the entire UA1, UA2, and UA3 applications on a single CD (no copies are needed). For NOIs, hard copies of UA1, Tables 2A, 2D & 2F, Section 3 and the signed Certification Page are required.

This application is submitted as (check all that apply)**:** ☐ Request for a No Permit Required Determination (no fee)
☐ **Updating** an application currently under NMED review. Include this page and all pages that are being updated (no fee required).
Construction Status: ☐ Not Constructed ☐ Existing Permitted (or NOI) Facility ☐ Existing Non-permitted (or NOI) Facility
Minor Source: ☐ a NOI 20.2.73 NMAC ☐ 20.2.72 NMAC application or revision ☐ 20.2.72.300 NMAC Streamline application
Title V Source: ☐ Title V (new) ☒ Title V renewal ☐ TV minor mod. ☐ TV significant mod. TV Acid Rain: ☐ New ☐ Renewal
PSD Major Source: ☐ PSD major source (new) ☐ minor modification to a PSD source ☐ a PSD major modification

Acknowledgements:

☑I acknowledge that a pre-application meeting is available to me upon request. ☑ Title V Operating, Title IV Acid Rain, and NPR applications have no fees.
☐ $500 NSR application Filing Fee enclosed OR ☐ The full permit fee associated with 10 fee points (required w/ streamline applications).
☐ Check No.: N/A in the amount of $500
☐ I acknowledge the required submittal format for the hard copy application is printed double sided 'head-to-toe', 2-hole punched (except the Sect. 2 landscape tables is printed 'head-to-head'), numbered tab separators. Incl. a copy of the check on a separate page.
☐ This facility qualifies to receive assistance from the Small Business Environmental Assistance program (SBEAP) and qualifies for 50% of the normal application and permit fees. Enclosed is a check for 50% of the normal application fee which will be verified with the Small Business Certification Form for your company.
☐ This facility qualifies to receive assistance from the Small Business Environmental Assistance Program (SBEAP) but does not qualify for 50% of the normal application and permit fees. To see if you qualify for SBEAP assistance and for the small business certification form go to https://www.env.nm.gov/aqb/sbap/small_business_criteria.html).

Citation: Please provide the **low level citation** under which this application is being submitted: **20.2.70.300.B.2 NMAC**
(e.g. application for a new minor source would be 20.2.72.200.A NMAC, one example for a Technical Permit Revision is 20.2.72.219.B.1.b NMAC, a Title V acid rain application would be: 20.2.70.200.C NMAC)

Section 1 – Facility Information

Section 1-A: Company Information

		AI # if known (see 1st 3 to 5 #s of permit IDEA ID No.): 888	Updating Permit/NOI #: P021-R3
1	Facility Name: Gallup Refinery	Plant primary SIC Code (4 digits): 2911 Plant NAIC code (6 digits): 324110	
a	Facility Street Address (If no facility street address, provide directions from a prominent landmark): 92 Giant Crossing Road, Gallup, NM 87302		
2	Plant Operator Company Name: Western Refining Southwest, Inc.	Phone/Fax: (505) 722-3833 / (505) 722-0210	
a	Plant Operator Address: 92 Giant Crossing Road, Gallup, NM 87301		
b	Plant Operator's New Mexico Corporate ID or Tax ID: NM 01-802059-003		
3	Plant Owner(s) name(s): Western Refining Southwest, Inc.	Phone/Fax: (505) 722-3833 / (505) 722-0210	
a	Plant Owner(s) Mailing Address(s): 92 Giant Crossing Road, Gallup, NM 87302		
4	Bill To (Company): Western Refining Southwest, Inc.	Phone/Fax: (505) 722-3833 / (505) 722-0210	
a	Mailing Address: 92 Giant Crossing Road, Gallup, NM 87301	E-mail: JMoore5@marathonpetroleum.com	
5	☑ Preparer: Jennifer Tullier ☑ Consultant: Spirit Environmental, LLC	Phone/Fax: (225) 892-1083	
a	Mailing Address: 15655 Airline Highway, #529, Prairieville, LA 70769	E-mail: jtullier@spiritenv.com	
6	Plant Operator Contact: John Moore	Phone/Fax: (505) 722-0205/ (505) 722-0210	
a	Address: 92 Giant Crossing Road, Gallup NM 87301	E-mail: JMoore5@marathonpetroleum.com	
7	Air Permit Contact: Brian Valenzuela-Alcantar	Title: Sr. Engineer, Environmental	
a	E-mail: BValenzuelaAlcantar@Marathonpetroleum.com	Phone/Fax: 505-726-9743	
b	Mailing Address: 92 Giant Crossing Road, Gallup NM 87301		

Section 1-B: Current Facility Status

1.a	Has this facility already been constructed? ☒ Yes ☐ No	1.b If yes to question 1.a, is it currently operating in New Mexico? ☒ Yes ☐ No
2	If yes to question 1.a, was the existing facility subject to a Notice of Intent (NOI) (20.2.73 NMAC) before submittal of this application? ☐ Yes ☒ No	If yes to question 1.a, was the existing facility subject to a construction permit (20.2.72 NMAC) before submittal of this application? ☐ Yes ☐ No
3	Is the facility currently shut down? ☐ Yes ☒ No	If yes, give month and year of shut down (MM/YY): N/A
4	Was this facility constructed before 8/31/1972 and continuously operated since 1972? ☒ Yes ☐ No	
5	If Yes to question 3, has this facility been modified (see 20.2.72.7.P NMAC) or the capacity increased since 8/31/1972? ☒ Yes ☐No ☐N/A	
6	Does this facility have a Title V operating permit (20.2.70 NMAC)? ☒ Yes ☐ No	If yes, the permit No. is: P-021-R3
7	Has this facility been issued a No Permit Required (NPR)? ☐ Yes ☒ No	If yes, the NPR No. is: N/A
8	Has this facility been issued a Notice of Intent (NOI)? ☐ Yes ☒ No	If yes, the NOI No. is: N/A
9	Does this facility have a construction permit (20.2.72/20.2.74 NMAC)? ☒ Yes ☐ No	If yes, the permit No. is: 0633-M16R1

10	Is this facility registered under a General permit (GCP-1, GCP-2, etc.)? ☐ Yes ☒ No	If yes, the register No. is: N/A

Section 1-C: Facility Input Capacity & Production Rate

1	What is the facility's maximum input capacity, specify units (reference here and list capacities in Section 20, if more room is required)			
a	Current[1]	Hourly: 35,400 BPD	Daily: 32,200 BPD	Annually: 29,000 BPD
b	Proposed	Hourly: 1,475 BPH	Daily: 32,200 BPD	Annually: 11,753,000 BPY[2]
2	What is the facility's maximum production rate, specify units (reference here and list capacities in Section 20, if more room is required)			
a	Current[3]	Hourly: 35,400 BPD	Daily: 32,200 BPD	Annually: 29,000 BPD
b	Proposed	Hourly: See Input Capacity[4]	Daily: See Input Capacity[4]	Annually: See Input Capacity[4]

1 Removal of prior submissions represented as "max instantaneous rate"
2. 32,200 BPD x 365 days/year
3. Removal of prior submissions represented as "max instantaneous rate" and requested removal of Production Rates
4. Due to the complex nature of refining operations and varying products, rates are listed only as a function of input capacity

Section 1-D: Facility Location Information

1	Section: 33	Range: 15W	Township: 15N	County: McKinley	Elevation (ft): 7,000
2	UTM Zone: ☒ 12 or ☐ 13			Datum: ☒ NAD 27 ☐ NAD 83 ☐ WGS 84	
a	UTM E (in meters, to nearest 10 meters): 733,600 m			UTM N (in meters, to nearest 10 meters): 3,930,100 m	
b	**AND** Latitude (deg., min., sec.): 35°29'25"			Longitude (deg., min., sec.): -108°25'30"	
3	Name and zip code of nearest New Mexico town: Gallup, NM 87301				
4	Detailed Driving Instructions from nearest NM town (attach a road map if necessary): From I-40 and Historic Route 66 in Gallup: travel East on I-40 for approximately 15 miles to the "Refinery" exit. The facility will be on the north side of the interstate.				
5	The facility is 17 miles east of Gallup, NM.				
6	Status of land at facility (check one): ☒ Private ☐ Indian/Pueblo ☐ Federal BLM ☐ Federal Forest Service ☐ Other (specify)				
7	List all municipalities, Indian tribes, and counties within a ten (10) mile radius (20.2.72.203.B.2 NMAC) of the property on which the facility is proposed to be constructed or operated: **Wingate, NM; Navajo Nation; McKinley County, NM**				
8	**20.2.72** NMAC applications **only**: Will the property on which the facility is proposed to be constructed or operated be closer than 50 km (31 miles) to other states, Bernalillo County, or a Class I area (see www.env.nm.gov/aqb/modeling/class1areas.html)? ☐ Yes ☒ No (20.2.72.206.A.7 NMAC) If yes, list all with corresponding distances in kilometers:				
9	Name nearest Class I area: **Petrified Forest National Park**				
10	Shortest distance (in km) from facility boundary to the boundary of the nearest Class I area (to the nearest 10 meters): **120.2 km**				
11	Distance (meters) from the perimeter of the Area of Operations (AO is defined as the plant site inclusive of all disturbed lands, including mining overburden removal areas) to nearest residence, school or occupied structure: **~900 meters**				
12	Method(s) used to delineate the Restricted Area: **Fence, security personnel, and locking gates** "**Restricted Area**" is an area to which public entry is effectively precluded. Effective barriers include continuous fencing, continuous walls, or other continuous barriers approved by the Department, such as rugged physical terrain with steep grade that would require special equipment to traverse. If a large property is completely enclosed by fencing, a restricted area within the property may be identified with signage only. Public roads cannot be part of a Restricted Area.				
13	Does the owner/operator intend to operate this source as a portable stationary source as defined in 20.2.72.7.X NMAC? ☐ Yes ☒ No A portable stationary source is not a mobile source, such as an automobile, but a source that can be installed permanently at one location or that can be re-installed at various locations, such as a hot mix asphalt plant that is moved to different job sites.				
14	Will this facility operate in conjunction with other air regulated parties on the same property? ☒ No ☐ Yes If yes, what is the name and permit number (if known) of the other facility?				

Section 1-E: Proposed Operating Schedule (The 1-E.1 & 1-E.2 operating schedules may become conditions in the permit.)

1	Facility **maximum** operating ($\frac{\text{hours}}{\text{day}}$): **24**	($\frac{\text{days}}{\text{week}}$): **7**	($\frac{\text{weeks}}{\text{year}}$): **52**	($\frac{\text{hours}}{\text{year}}$): **8,760**
2	Facility's maximum daily operating schedule (if less than 24 $\frac{\text{hours}}{\text{day}}$)? Start: **N/A**	☐AM ☐PM	End: **N/A**	☐AM ☐PM
3	Month and year of anticipated start of construction: **N/A**			
4	Month and year of anticipated construction completion: **N/A**			
5	Month and year of anticipated startup of new or modified facility: **N/A**			
6	Will this facility operate at this site for more than one year? ☒ Yes ☐ No			

Section 1-F: Other Facility Information

1	Are there any current Notice of Violations (NOV), compliance orders, or any other compliance or enforcement issues related to this facility? ☒ Yes ☐ No If yes, specify:		
a	1/22/09 Amended Stipulated Final Order 8/12/09 Consent Agreement and Final Order 5/24/12 Western Giant Second Amended Stipulated Final Order April 2014 Settlement Agreement and SFO		CO#AQCA05-22 RCRA 06-2009-0936 CO#AQCA05-22 AQB WES-0888-1201-R1 (NOV)
b	Is this application in response to any issue listed in 1-F, 1 or 1a above? ☐ Yes ☒ No If Yes, provide the 1c & 1d info below:		
c	Document Title:	Date:	Requirement # (or page # and paragraph #):
d	Provide the required text to be inserted in this permit:		
2	Is air quality dispersion modeling or modeling waiver being submitted with this application? ☐ Yes ☒ No		
3	Does this facility require an "Air Toxics" permit under 20.2.72.400 NMAC & 20.2.72.502, Tables A and/or B? ☐ Yes ☒ No		
4	Will this facility be a source of federal Hazardous Air Pollutants (HAP)? ☒ Yes ☐ No		
a	If Yes, what type of source? ☒ **Major** (☐ ≥10 tpy of any single HAP **OR** ☒ ≥25 tpy of any combination of HAPS) **OR** ☐ **Minor** (☐ <10 tpy of any single HAP **AND** ☐ <25 tpy of any combination of HAPS)		
5	Is any unit exempt under 20.2.72.202.B.3 NMAC? ☒ Yes ☐ No		
a	If yes, include the name of company providing commercial electric power to the facility: Continental Divide Cooperative Commercial power is purchased from a commercial utility company, which specifically does not include power generated on site for the sole purpose of the user.		

Section 1-G: Streamline Application (This section applies to 20.2.72.300 NMAC Streamline applications only)

1	☐ I have filled out Section 18, "Addendum for Streamline Applications."	☒ N/A (This is not a Streamline application.)

Section 1-H: Current Title V Information - Required for all applications from TV Sources

(Title V-source required information for all applications submitted pursuant to 20.2.72 NMAC (Minor Construction Permits), or 20.2.74/20.2.79 NMAC (Major PSD/NNSR applications), and/or 20.2.70 NMAC (Title V))

1	Responsible Official (R.O.) (20.2.70.300.D.2 NMAC): Robert S. Hanks	Phone: 505-722-0202
a	R.O. Title: Refinery General Manager	R.O. e-mail: scotthanks@marathonpetroleum.com
b	R. O. Address: 68 El Paso Circle, Gallup, New Mexico 87301	

2	Alternate Responsible Official (20.2.70.300.D.2 NMAC): Kim D. Pruner	Phone: 505-726-9741
a	A. R.O. Title: Environmental, Health & Safety Manager	A. R.O. e-mail: kdpruner@marathonpetroleum.com
b	A. R. O. Address: 92 Giant Crossing Rd, Gallup, NM 87301	
3	Company's Corporate or Partnership Relationship to any other Air Quality Permittee (List the names of any companies that have operating (20.2.70 NMAC) permits and with whom the applicant for this permit has a corporate or partnership relationship): N/A	
4	Name of Parent Company ("Parent Company" means the primary name of the organization that owns the company to be permitted wholly or in part.): Western Refining Southwest, Inc.	
a	Address of Parent Company: 1250 W. Washington St., Tempe, AZ 85281	
5	Names of Subsidiary Companies ("Subsidiary Companies" means organizations, branches, divisions or subsidiaries, which are owned, wholly or in part, by the company to be permitted.): Western Refining Southwest, Inc., Western Refining Terminals, LLC., Western Refining Pipeline Company, Western Refining LP, San Juan Refining Company, Western Refining Wholesale, Inc.; Dial Oil Co. dba Western Refining Wholesale – New Mexico; Phoenix Fuel Co.; Empire Oil Co. dba Western Refining Wholesale – California; Giant Stop-N-Go of New Mexico, Inc.; Ciniza Production Company; Giant Four Corners, Inc.; Navajo Convenient Stores, LLC; Western ALH Holdings I, LLC; Western ALH Holdings II, LLC; Western Refining ALH, LLC	
6	Telephone numbers & names of the owners' agents and site contacts familiar with plant operations: John Moore 505-722-0205	
7	Affected Programs to include Other States, local air pollution control programs (i.e. Bernalillo) and Indian tribes: Will the property on which the facility is proposed to be constructed or operated be closer than 80 km (50 miles) from other states, local pollution control programs, and Indian tribes and pueblos (20.2.70.402.A.2 and 20.2.70.7.B)? If yes, state which ones and provide the distances in kilometers: **Arizona state line, ~55 km; Navajo Nation, <5 km; Zuni Nation, ~20 km; Ramah Najavo Land, ~40 km;**	

Section 1-I – Submittal Requirements

Each 20.2.73 NMAC (**NOI**), a 20.2.70 NMAC (**Title V**), a 20.2.72 NMAC (**NSR** minor source), or 20.2.74 NMAC (**PSD**) application package shall consist of the following:

Hard Copy Submittal Requirements:

1) One hard copy **original signed and notarized application package printed double sided 'head-to-toe' 2-hole punched** as we bind the document on top, not on the side; except Section 2 (landscape tables), which should be head-to-head. Please use **numbered tab separators** in the hard copy submittal(s) as this facilitates the review process. For NOI submittals only, hard copies of UA1, Tables 2A, 2D & 2F, Section 3 and the signed Certification Page are required. Please include a copy of the check on a separate page.

2) If the application is for a minor NSR, PSD, NNSR, or Title V application, include one working hard **copy** for Department use. This copy does not need to be 2-hole punched, but **must be double sided**. Minor NSR Technical Permit revisions (20.2.72.219.B NMAC) only need to fill out Sections 1-A, 1-B, 3, and should fill out those portions of other Section(s) relevant to the technical permit revision. TV Minor Modifications need only fill out Sections 1-A, 1-B, 1-H, 3, and those portions of other Section(s) relevant to the minor modification. NMED may require additional portions of the application to be submitted, as needed.

3) The entire NOI or Permit application package, including the full modeling study, should be submitted electronically on compact disk(s) (CD). For permit application submittals, two CD copies are required (in sleeves, not crystal cases, please), with additional CD copies as specified below. NOI applications require only a single CD submittal.

4) If **air dispersion modeling** is required by the application type, include the **NMED Modeling Waiver OR** one additional electronic copy of the air dispersion modeling including the input and output files. The dispersion modeling ***summary report only*** should be submitted as hard copy(ies) unless otherwise indicated by the Bureau. The complete dispersion modeling study, including all input/output files, should be submitted electronically as part of the electronic submittal.

5) If subject to PSD review under 20.2.74 NMAC (PSD) or NNSR under 20.2.79 NMC include,
   a. one additional CD copy for US EPA,
   b. one additional CD copy for each federal land manager affected (NPS, USFS, FWS, USDI) and,
   c. one additional CD copy for each affected regulatory agency other than the Air Quality Bureau.

Electronic Submittal Requirements [in addition to the required hard copy(ies)]:

1) All required electronic documents shall be submitted in duplicate (2 separate CDs). A single PDF document of the entire application as submitted and the individual documents comprising the application.

2) The documents should also be submitted in Microsoft Office compatible file format (Word, Excel, etc.) allowing us to access the text and formulas in the documents (copy & paste). Any documents that cannot be submitted in a Microsoft Office compatible format shall be saved as a PDF file from within the electronic document that created the file. If you are unable to provide Microsoft office compatible electronic files or internally generated PDF files of files (items that were not created electronically: i.e. brochures, maps, graphics, etc,), submit these items in hard copy format with the number of additional hard copies corresponding to the number of CD copies required. We must be able to review the formulas and inputs that calculated the emissions.

3) It is preferred that this application form be submitted as 3 electronic files (2 MSWord docs: Universal Application section 1 and Universal Application section 3-19) and 1 Excel file of the tables (Universal Application section 2) on the CD(s). Please include as many of the 3-19 Sections as practical in a single MS Word electronic document. Create separate electronic file(s) if a single file becomes too large or if portions must be saved in a file format other than MS Word.

4) The electronic file names shall be a maximum of 25 characters long (including spaces, if any). The format of the electronic Universal Application shall be in the format: "A-3423-FacilityName". The "A" distinguishes the file as an application submittal, as opposed to other documents the Department itself puts into the database. Thus, all electronic application submittals should begin with "A-". Modifications to existing facilities should use the core permit number (i.e. '3423') the Department assigned to the facility as the next 4 digits. Use 'XXXX' for new facility applications. The format of any separate electronic submittals (additional submittals such as non-Word attachments, re-submittals, application updates) and Section document shall be in the format: "A-3423-9-description", where "9" stands for the section # (in this case Section 9-Public Notice). Please refrain, as much as possible, from submitting any scanned documents as this file format is extremely large, which uses up too much storage capacity in our database. Please take the time to fill out the header information throughout all submittals as this will identify any loose pages, including the Application Date (date submitted) & Revision # (0 for original, 1, 2, etc.; which will help keep track of subsequent partial update(s) to the original submittal. The footer information should not be modified by the applicant.

Table of Contents

Table 2-A: Regulated Emission Sources

Unit and stack numbering must correspond throughout the application package. If applying for a NOI under 20.2.73 NMAC, equipment exemptions under 2.72.202 NMAC do not apply.

Unit Number[1]	Source Description	Make	Model #	Serial #	Manufact-urer's Rated Capacity[3] (Specify Units)	Requested Permitted Capacity[3] (Specify Units)	Date of Manufacture[2] Date of Construction/ Reconstruction[2]	Controlled by Unit # Emissions vented to Stack #	Source Classi-fication Code (SCC)	For Each Piece of Equipment, Check One	RICE Ignition Type (CI, SI, 4SLB, 4SRB, 2SLB)[4]	Replacing Unit No.
Z-81-G104	Gas turbine/cogenerator (part of cogen unit)	US Turbine	N/A	Unknown	32 MMBtu/hr	N/A	1990 1990	N/A Z-81-G104	3060 0106	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
Z-81-B104	Steam boiler (part of cogen unit)	Deltak	N/A	Unknown	52 MMBtu/hr	N/A	1990 1990	N/A Z-81-B104	3060 0106	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
Z-81-G105	Gas turbine/cogenerator (part of cogen unit)	US Turbine	N/A	Unknown	32 MMBtu/hr	N/A	1990 1990	N/A Z-81-G105	3060 0106	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
Z-81-B105	Steam boiler (part of cogen unit)	Deltak	N/A	Unknown	52 MMBtu/hr	N/A	1990 1990	N/A Z-81-B105	3060 0106	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
Z-81-B106	Boiler	Holman	N/A	Unknown	96.7 MMBtu/hr	N/A	1999 12/10 (Modification)	N/A Z-81-B106	3060 0106	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
GC-1A	Gas Compressor Engine (RICE)	Worthington	SLHC-4	G-2343	330 hp	N/A	Unknown 1957	N/A G-C1A	3060 2401	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	4SLB	N/A
GC-1B	Gas Compressor Engine (RICE)	Worthington	SLHC-4	G-2344	330 hp	N/A	Unknown 1957	N/A G-C1B	3060 2401	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	4SLB	N/A
GC-1C	Gas Compressor Engine (RICE)	Worthington	58-2	G2435	330 hp	N/A	Unknown 1957	N/A G-C1C	3060 2401	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	4SLB	N/A
PC-1A	Gas Compressor Engine (RICE)	Worthington	N/A	N/A	450 hp	N/A	Unknown 1957	N/A P-C1A	3060 2401	☐ Existing (unchanged) ☒ **To be Removed** ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	4SLB	N/A
PC-1B	Gas Compressor Engine (RICE)	Worthington	SLHC-6	G-2346	450 hp	N/A	Unknown 1957	N/A P-C1B	3060 2401	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	4SLB	N/A
C-H5 (Low-NOx)	Furnace	Petrochem	N/A	N/A	31.5 MMBtu/hr	N/A	Unknown 1961	N/A C-H5	3060 0106	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
P-H2 (Low-NOx)	Furnace	Optimized Process	N/A	N/A	33 MMBtu/hr	N/A	Unknown 1998	N/A P-H2	3060 0106	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
A-H2	Furnace	KW Anderson	N/A	N/A	23 MMBtu/hr	N/A	Unknown 1977	N/A A-H2	3060 0106	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
D-H2	Vertical/cylindrical ultra low sulfur DHT feed heater	Broach/ Job# 20071226	N/A	Unknown	6.9 MMBtu/hr	N/A	2007 2007	N/A D-H2	3060 0106	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
D-H3	Vertical/cylindrical trickle bed reactor feed heater with two Low Nox burners	Optimized Process Furnace	N/A	J045931	2 x 4.95 MM Btu/hr	N/A	2005 2005	N/A D-H3	3060 0106	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
Z-81-B102	Boiler	Vogt	N/A	Unknown	65.9 MMBtu/hr	N/A	1957 1957	N/A Z-81-B102	3060 0106	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
FB-1	CO Boiler (Replacement)	Babcock and Wilcox	N/A	201-3627	70 MMBtu/hr	N/A	2012 9/12	ESP ESP	3060 0106	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A

Unit Number[1]	Source Description	Make	Model #	Serial #	Manufact-urer's Rated Capacity[3] (Specify Units)	Requested Permitted Capacity[3] (Specify Units)	Date of Manufacture[2] Date of Construction/ Reconstruction[2]	Controlled by Unit # Emissions vented to Stack #	Source Classi-fication Code (SCC)	For Each Piece of Equipment, Check One	RICE Ignition Type (CI, SI, 4SLB, 4SRB, 2SLB)[4]	Replacing Unit No.
C-H1 (Low-NOx)	Furnace	W-K-M Mfg. Co.	N/A	Unknown	77 MMBtu/hr	N/A	1957 1957	N/A C-H1	3060 0106	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
C-H2	Furnace	W-K-M Mfg. Co.	N/A	N/A	30.5 MMBtu/hr	N/A	1957 1957	N/A C-H2	3060 0106	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
H-F1	Furnace	KW Anderson GC Broach	N/A	N/A	23 MMBtu/hr	N/A	1970 1970	N/A H-F1	3060 0106	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
H-F2	Furnace	KW Anderson GC Broach	N/A	N/A	15 MMBtu/hr	N/A	1970 1970	N/A H-F2	3060 0106	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
P-H1 (dual stacks)	Furnace	UOP Design	N/A	N/A	49 MMBtu/hr	N/A	1957 1957	N/A P-H1	3060 0106	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
D-H1A (Low-NOx)	Furnace	InServ	N/A	N/A	7.2 MMBtu/hr	N/A	2007 2007	N/A D-H1A	3060 0106	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
FL-1	Smokeless Flare Tip	John Zink/McGill Americas SMS-20-I	Americas SMS-20-I EEF-HASSHEP-20	Unknown	231 MM Btu/hr (Process Gas) 0.1 MM Btu/hr (Pilot)	N/A	2013 (Tip) 1957 2013 (Tip) 1957	N/A FL-1	3060 0904	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
TV-1	Sour Water Amine Ammonium Thiosulfate Solution (SWAATS) Gas Processing Unit	Jim Davidson	N/A	Unknown	N/A	N/A	2006 2006	N/A TV-1	3060 3201	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
DHT	Diesel Hydrotreater	N/A	N/A	Unknown	5000 bpd	N/A	1993 1993	N/A N/A	3060 1701	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
KHT	Kerosene Hydrotreater	N/A	N/A	Unknown	6000 bpd	N/A	2007 2007	N/A N/A	3060 1701	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
NHT	Naphtha Hydrotreater	N/A	N/A	Unknown	TBD	N/A	TBD TBD	N/A N/A	3060 1701	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
FCCU	Fluid Catalytic Cracking Unit	N/A	N/A	Unknown	9200 bpd	9200 bpd	1957 1957	ESP ESP	3060 0201	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
PLAT	Platformer	N/A	N/A	Unknown	7300 bpd	N/A	1957 1998 (Modification)	N/A N/A	3060 1601	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
ISOM	Isomerization Unit	N/A	N/A	N/A	5000 bpd	N/A	1986 1986	N/A N/A	3060 0801	☐ Existing (unchanged) ☒ **To be Removed** ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
I-H1	Furnace	Radco	N/A	20071226	13.4 mmbtu/hr	N/A	1986 1986	N/A N/A	3060 0106	☐ Existing (unchanged) ☒ **To be Removed** ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
I-H2	Furnace	Petrochem	N/A	N/A	7.3 mmbtu/hr	N/A	1986 1986	N/A N/A	3060 0106	☐ Existing (unchanged) ☒ **To be Removed** ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
TRUCK	Truck Loading Rack Controlled by VRU	N/A	N/A	N/A	N/A	N/A	1998 1957	VRU TRUCK	4038 8801	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A

Unit Number[1]	Source Description	Make	Model #	Serial #	Manufact-urer's Rated Capacity[3] (Specify Units)	Requested Permitted Capacity[3] (Specify Units)	Date of Manufacture[2] Date of Construction/ Reconstruction[2]	Controlled by Unit # Emissions vented to Stack #	Source Classi-fication Code (SCC)	For Each Piece of Equipment, Check One	RICE Ignition Type (CI, SI, 4SLB, 4SRB, 2SLB)[4]	Replacing Unit No.
TK-R	Tanks at the Refinery	Varies	Varies	Varies	Varies	N/A	Varies Varies	N/A EG-1	Varies	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
TK-L	Tanks at the Terminal	Varies	Varies	Varies	Varies	N/A	Varies Varies	N/A EG-1	Varies	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
RAIL	Rail Car Loading & Unloading Rack controlled by flare FL-1	N/A	N/A	N/A	N/A	N/A	Varies Varies	FL-1 RAIL	4038 8801	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
SRU	Sulfurox Sulfur Recovery Unit	Sulferox	N/A	N/A	N/A	N/A	1993 1993	N/A SRU	3060 3301	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
FUG-R	Facility Wide Fugitives (Refinery)	N/A	N/A	N/A	N/A	N/A	N/A N/A	N/A F	3060 0801-0820	☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit **☒ To Be Modified** ☐ To be Replaced	N/A	N/A
FUG-L	Fugitives associated with TRUCK, RAIL, and TK-L	N/A	N/A	N/A	N/A	N/A	N/A N/A	N/A F	3060 0801-0820	☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit **☒ To Be Modified** ☐ To be Replaced	N/A	N/A
WWS[4]	Wastewater Treatment System (including API oil water separator, DGF System, and MPPE System)	Various	N/A	N/A	500 gpm	N/A	Various Various	N/A WWS	3060-0505, 0508	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
CT-1 CT-2	Cooling Towers	N/A	N/A	N/A	4500 gpm (each)	N/A	Unknown 1957	N/A CT-1/2	3060 0701	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
AM	Amine Unit	N/A	N/A	N/A	unknown	N/A	Unknown N/A	N/A AM	3060 0801-0820	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
SWS	Sour Water Stripper	N/A	N/A	N/A	N/A	N/A	N/A N/A	N/A SWS	3060 0801-0820	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
SM-1 SM-2	Electronically-Driven Evaporation Pond Spraying Snow Machine	Snow Machine, Inc.	SM1320	2842 2843	80 gpm each	N/A	Unknown Jul-02	N/A SM-1 SM-2	3068 8801	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
Passive Bio-remediation	Vent Systems for ULSD Spills (various locations)	Shop Built	N/A	N/A	N/A	N/A	Unknown Unknown	N/A Passive Bio-remediation	3060 0801-0820	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
EG-2	Emergency Generator (RICE)	Detroit Diesel	16V-092T 81237405	2A04765	830 hp	N/A	1989 1989	N/A EG-2	20200-102	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	CI	N/A
EG-3	Emergency Generator (RICE)	Detroit Diesel	16V-149TI	235058520-2319	2,500 hp	N/A	1989 1989	N/A EG-3	20200-102	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	CI	N/A
EG-4	Emergency Generator (RICE)	Western Detroit Diesel Allison	16V-149TI	235058520-1010	2,500 hp	N/A	1989 1989	N/A EG-4	20200-102	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	CI	N/A
EG-6	Emergency Generator (RICE)	Caterpillar	C15 ACERT	N/A	546 hp	N/A	2013 2013	N/A EG-6	20200-102	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	CI	N/A
Z-86-P2.1	Emergency Fire Water Pump (RICE)	Cummins	QSB6.7	N/A	240 hp	N/A	After 2006 After 2006	N/A Z-86-P2.1	20200-102	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	CI	Z-86-P2

Unit Number[1]	Source Description	Make	Model #	Serial #	Manufact-urer's Rated Capacity[3] (Specify Units)	Requested Permitted Capacity[3] (Specify Units)	Date of Manufacture[2] Date of Construction/ Reconstruction[2]	Controlled by Unit # Emissions vented to Stack #	Source Classi-fication Code (SCC)	For Each Piece of Equipment, Check One	RICE Ignition Type (CI, SI, 4SLB, 4SRB, 2SLB)[4]	Replacing Unit No.
Z-91-DE10	Emergency Fire Water Pump (RICE)	Allis Chalmers	2100 MK II	OA-8025-1	385 hp	N/A	Before 1974 2006 for replacement unit Z-91-DE10	N/A Z-91-DE10	20200-102	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	CI	N/A
AC-8	Emergency Air Compressor (RICE)	Detroit Diesel	12V-71N	N/A	405 hp	N/A	1974 Prior to 7/2005	N/A AC-8	20200-102	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	CI	N/A
SATS	Saturates Gas Unit	N/A	N/A	N/A	N/A	N/A	Unknown Unknown	N/A N/A		☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
CRUDE	Crude Distillation Unit	N/A	N/A	N/A	N/A	N/A	Unknown Unknown	N/A N/A	30602-001	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
ESP	Electrostatic Precipitator, Dry Plate	Hamon Research-Cottrell	Custom Built	N/A	N/A	N/A	N/A 9/2012	N/A ESP	3060 0106	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
GASCON	Gas Concentration Unit	N/A	N/A	N/A	N/A	N/A	Unknown Unknown	N/A N/A		☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
ALKY	Alkylation Unit	N/A	N/A	N/A	N/A	N/A	Unknown Unknown	N/A N/A	30601-603	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
EV-3	Wastewater evaporator/ sprayer	Snow Machines, Inc. (SMI)	420B	9352	66 gal/min	N/A	N/A 6/1/2014	N/A EV-3	3068-8801	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
EV-4	Wastewater evaporator/ sprayer	Snow Machines, Inc. (SMI)	420B	9353	66 gal/min	N/A	N/A 6/1/2014	N/A EV-4	3068-8801	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
BENSAT[6]	Naphtha Splitter	Unknown	Unknown	Unknown	N/A	N/A	Unknown Unknown	N/A N/A		☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
AC-11	Air Compressor	Caterpillar	C15 ATAAC	Unknown	525 hp/ 478 hp	N/A	2002 Unknown	N/A N/A	20200-102	☐ Existing (unchanged) ☒ **To be Removed** ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	CI	N/A
AC-12	Emergency air compressor diesel engine	Caterpillar	C13 ATAAC	RRA09652	440 hp	None	3/19/2015 N/A	N/A AC-12	20200-102	☐ Existing (unchanged) ☐ To be Removed ☒ **New/Additional** ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	CI	N/A
PECS	Portable Emission Control System	John Zink	Not reported, rental	Not Reported, rental	2,514 bbl/hr loading	N/A	N/A N/A	N/A PECS	3060 9905	☐ Existing (unchanged) ☐ To be Removed ☒ **New/Additional** ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
GEN-1	Diesel Generator	Caterpillar	3306B DI	N/A	382 hp	N/A	2013 N/A	N/A GEN-1	20200-102	☐ Existing (unchanged) ☐ To be Removed ☒ **New/Additional** ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	CI	N/A
FW-1	Fire Pump (RICE)	Caterpillar	C18 ACERT	Not Reported	755 hp/693 hp	N/A	2017 N/A	N/A FW-1	20200-102	☐ Existing (unchanged) ☐ To be Removed ☒ **New/Additional** ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	CI	N/A
FW-2	Fire Pump (RICE)	Caterpillar	C18 ACERT	Not Reported	755 hp/693 hp	N/A	2017 N/A	N/A FW-2	20200-102	☐ Existing (unchanged) ☐ To be Removed ☒ **New/Additional** ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	CI	N/A
ALKY De-inventory Pressure Vessel	HF Pressure Vessel	Unknown	Not reported	N/A	3,400 cubic feet	N/A	Unknown Unknown	 N/A		☐ Existing (unchanged) ☐ To be Removed ☒ **New/Additional** ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A

Unit Number[1]	Source Description	Make	Model #	Serial #	Manufact-urer's Rated Capacity[3] (Specify Units)	Requested Permitted Capacity[3] (Specify Units)	Date of Manufacture[2] / Date of Construction/ Reconstruction[2]	Controlled by Unit # / Emissions vented to Stack #	Source Classi-fication Code (SCC)	For Each Piece of Equipment, Check One	RICE Ignition Type (CI, SI, 4SLB, 4SRB, 2SLB)[4]	Replacing Unit No.

1 Unit numbers must correspond to unit numbers in the previous permit unless a complete cross reference table of all units in both permits is provided.

2 Specify dates required to determine regulatory applicability.

3 Provided for informational purposes. Not an enforceable limit.

4 The Waste Water System includes an API Separator, Dissolved Gas Flotation System (Z-84-V11, Z84-V12, Z84-V15), Macro Porous Polymer Filter System (Z84-V16, 17, 18, and 19), and a Sanitary Treatment Pond, a Lined Aeration Impoundment and miscellaneous exempt tanks and vessels.

5 Sea level hp of 525 hp; Site hp of 478 hp by applying NMED derate policy to 525 hp (sea level).

6 The unit's emissions are accounted for in the plant fugitives and in the vessel purge SSM emissions.

Table 2-B: Insignificant Activities[1] (20.2.70 NMAC) OR Exempted Equipment (20.2.72 NMAC)

All 20.2.70 NMAC (Title V) applications must list all Insignificant Activities in this table. All 20.2.72 NMAC applications must list Exempted Equipment in this table. If equipment listed on this table is exempt under 20.2.72.202.B.5, include emissions calculations and emissions totals for 202.B.5 "similar functions" units, operations, and activities in Section 6, Calculations. Equipment and activities exempted under 20.2.72.202 NMAC may not necessarily be Insignificant under 20.2.70 NMAC (and vice versa). Unit & stack numbering must be consistent throughout the application package. Per Exemptions Policy 02-012.00 (see http://www.env.nm.gov/aqb/permit/aqb_pol.html), 20.2.72.202.B NMAC Exemptions do not apply, but 20.2.72.202.A NMAC exemptions do apply to NOI facilities under 20.2.73 NMAC. List 20.2.72.301.D.4 NMAC Auxiliary Equipment for Streamline applications in Table 2-A. The List of Insignificant Activities (for TV) can be found online at http://www.env.nm.gov/aqb/forms/InsignificantListTitleV.pdf . TV sources may elect to enter both TV Insignificant Activities and Part 72 Exemptions on this form.

Unit Number	Source Description	Manufacturer	Model No.	Max Capacity	List Specific 20.2.72.202 NMAC Exemption (e.g. 20.2.72.202.B.5)	Date of Manufacture /Reconstruction[2]	For Each Piece of Equipment, Check Onc
			Serial No.	Capacity Units	Insignificant Activity citation (e.g. IA List Item #1.a)	Date of Installation /Construction[2]	
Z84-V15	DGF Float Tank (WWS)	TBD	N/A	TBD	20.2.72.202.B.5. NMAC	TBD	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
			N/A	TBD	IA List Item #1.a.	TBD	
Z84-V23	Flocculant Tote	TBD	N/A	TBD	20.2.72.202.B.5. NMAC	TBD	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
			N/A	TBD	IA List Item #1.a.	TBD	
Z84-V24	Acid Tote	TBD	N/A	TBD	20.2.72.202.B.5. NMAC	TBD	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
			N/A	TBD	IA List Item #1.a.	TBD	
GR-49	Trash pump	Unknown	Power Prime Pumps HH80	84.3	20.2.72.202.A.2. NMAC	Unknown	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
			Unknown	BHP	Trivial source	Unknown	
TP-6	2 Trash pumps	Unknown	Unknown	71	20.2.72.202.A.2. NMAC	Unknown	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
			Unknown	BHP (each)	Trivial source	Unknown	
Rammer	Rammer	Unknown	Unknown	3.1	20.2.72.202.A.1. NMAC	Unknown	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
			Unknown	BHP	Trivial source	Unknown	
375-1	Air compressor	John Deere	4045	115	20.2.72.202.A.2. NMAC	2006	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
			Unknown	BHP	Trivial source	Unknown	
375-2	Air compressor	John Deere	4045	115	20.2.72.202.A.2. NMAC	2010	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
			Unknown	BHP	Trivial source	Unknown	
375-3	Air compressor	John Deere	4045	115	20.2.72.202.A.2. NMAC	2010	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
			Unknown	BHP	Trivial source	Unknown	
Emergency generator	Emergency generator	Volvo	720 GE	181	20.2.72.202.B.3. NMAC	Unknown	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
			Unknown	BHP	IA List Item #7	2010	
TRUCK	Crude unloading at truck rack	N/A	N/A	N/A	20.2.72.202.B(5)	1998	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
			N/A	N/A	IA List Item #1.a.	1957	
C-V36	Fuel Gas Filter	N/A	N/A	N/A	20.2.72.202.B.5 NMAC	2013	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
			N/A	N/A	IA List Item #1.a.	2013	
C-V37	Fuel Gas Filter	N/A	N/A	N/A	20.2.72.202.B.5 NMAC	2013	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
			N/A	N/A	IA List Item #1.a.	2013	
T-77	Biodiesel Tank	N/A	N/A	N/A	20.2.72.202.B.2 NMAC	2013	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
			N/A	N/A		2013	

Unit Number	Source Description	Manufacturer	Model No. / Serial No.	Max Capacity / Capacity Units	List Specific 20.2.72.202 NMAC Exemption (e.g. 20.2.72.202.B.5) / Insignificant Activity citation (e.g. IA List Item #1.a)	Date of Manufacture /Reconstruction[2] / Date of Installation /Construction[2]	For Each Piece of Equipment, Check Onc
T-78	Biodiesel Tank	N/A	N/A	N/A	20.2.72.202.B.2 NMAC	2013	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
			N/A	N/A		2013	
DEF	Diesel Exhaust Fluid Tank	N/A	N/A	N/A	20.2.72.202.B.2 NMAC	2014	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
			N/A	N/A		2014	

[1] Insignificant activities exempted due to size or production rate are defined in 20.2.70.300.D.6, 20.2.70.7.Q NMAC, and the NMED/AQB List of Insignificant Activities, dated September 15, 2008. Emissions from these insignificant activities do not need to be reported, unless specifically requested.

[2] Specify date(s) required to determine regulatory applicability.

Table 2-C: Emissions Control Equipment

Unit and stack numbering must correspond throughout the application package. Only list control equipment for TAPs if the TAP's maximum uncontrolled emissions rate is over its respective threshold as listed in 20.2.72 NMAC, Subpart V, Tables A and B. In accordance with 20.2.72.203.A(3) and (8) NMAC, 20.2.70.300.D(5)(b) and (e) NMAC, and 20.2.73.200.B(7) NMAC, the permittee shall report all control devices and list each pollutant controlled by the control device regardless if the applicant takes credit for the reduction in emissions.

Control Equipment Unit No.	Control Equipment Description	Date Installed	Controlled Pollutant(s)	Controlling Emissions for Unit Number(s)[1]	Efficiency (% Control by Weight)	Method used to Estimate Efficiency
VRU	Vapor recovery unit	Unknown	VOC, HAPs, H2S	TRUCK	~98% @ 10 mg/l loaded	Calculation; Mfg. data
PECS	Portable Emissions Control System using Vapor Combustion during VRU Maintenance	Unknown	VOC, HAPs	TRUCK	10 mg/L loaded	Mfg. data
Z-84-T5/F1	Carbon adsorption for covered API separator	2004	VOC, HAPs	WWS	90%	TV-A 1000 Analyzer
Z-84-T5/F2	Carbon adsorption for DGF Feed Tank	05/12	VOC, HAPs	WWS	90%	TV-A 1000 Analyzer
Z-84-V26 Z-84-V27	Carbon adsorption for DGF Unit (except DGF Feed Tank)	05/12	VOC, HAPs	WWS	90%	TV-A 1000 Analyzer
FL-1	Process Flare	Unknown	VOC, HAPs, H2S	Various	98%	Nominal
ESP[2]	Electrostatic Precipitator, Dry Plate, 5 Fields	41153	TSP, PM_{10}	FCCU, FB-1	0.988	2018 Stack Test and Theoretical Calculation
ESP[2]	Electrostatic Precipitator, Dry Plate, 5 Fields	41153	$PM_{2.5}$	FCCU, FB-1	0.803	2018 Stack Test and Theoretical Calculation
Caustic Scrubber	Caustic Scrubber for ALKY De-Inventory Pressure Vessel	Unknown	HF	ALKY De-Inventory Pressure Vessel	~100%	Engineering judgement
SRU/TV-1	Sulferox Sulfur Recovery Unit and Sour Water Amine Ammonium Thiosulfate Gas Processing Unit	Unknown	H2S	H2S generated from all process units at the facility	0.10 gr/dscf	Stiplated Final Order requirement
FB-1	CO Boiler	9/12	CO	FCCU	500 ppm	Stipulated Final Order requirement

[1] List each control device on a separate line. For each control device, list all emission units controlled by the control device.

[2] These control efficiencies are only used for purposes of back-calculating uncontrolled emissions when the bypassing the FB-1 boiler CO and ESP PM controls.

Table 2-D: Maximum Emissions (under normal operating conditions)

☐ **This Table was intentionally left blank because it would be identical to Table 2-E.**

Maximum Emissions are the emissions at maximum capacity and prior to (in the absence of) pollution control, emission-reducing process equipment, or any other emission reduction. Calculate the hourly emissions using the worst case hourly emissions for each pollutant. For each pollutant, calculate the annual emissions as if the facility were operating at maximum plant capacity without pollution controls for 8760 hours per year, unless otherwise approved by the Department. List Hazardous Air Pollutants (HAP) & Toxic Air Pollutants (TAPs) in Table 2-I. Unit & stack numbering must be consistent throughout the application package. Fill all cells in this table with the emission numbers or a "-" symbol. A "-" symbol indicates that emissions of this pollutant are not expected. Numbers shall be expressed to at least 2 decimal points (e.g. 0.41, 1.41, or 1.41E-4).

Unit No.	NOx		CO		VOC		SOx		TSP[2]		PM10[2]		PM2.5[2]		H_2S		Lead	
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
Z-81-G104	7.30	31.97	0.96	4.20	0.07	0.29	0.50	2.20	0.21	0.93	0.21	0.93	0.21	0.93	-	-	-	-
Z-81-B104	2.70	11.83	4.26	18.68	0.28	1.23	0.82	3.58	0.39	1.70	0.39	1.70	0.39	1.70	-	-	-	-
Z-81-G105	7.30	31.97	0.96	4.20	0.07	0.29	0.50	2.20	0.21	0.93	0.21	0.93	0.21	0.93	-	-	-	-
Z-81-B105	2.70	11.83	4.26	18.68	0.28	1.23	0.82	3.58	0.39	1.70	0.39	1.70	0.39	1.70	-	-	-	-
Z-81-B106	3.87	16.94	7.96	34.88	0.52	2.28	3.71	6.13	0.72	3.16	0.72	3.16	0.72	3.16	-	-	-	-
G-C1A	11.50	50.37	8.50	37.23	0.35	1.54	0.11	0.50	0.03	0.13	0.03	0.13	0.03	0.13	-	-	-	-
G-C1B	11.08	48.53	8.50	37.23	0.35	1.54	0.11	0.50	0.03	0.13	0.03	0.13	0.03	0.13	-	-	-	-
G-C1C	12.80	56.06	8.50	37.23	0.35	1.54	0.11	0.50	0.03	0.13	0.03	0.13	0.03	0.13	-	-	-	-
P-C1A	This source is being deleted with this Permit Renewal Application.																	
P-C1B	8.66	37.91	8.50	37.23	0.48	2.09	0.16	0.68	0.04	0.18	0.04	0.18	0.04	0.18	-	-	-	-
C-H5	3.09	13.53	1.26	5.52	0.17	0.74	1.21	2.00	0.23	1.02	0.23	1.02	0.23	1.02	-	-	-	-
P-H2	3.23	14.16	1.32	5.78	0.18	0.78	1.27	5.60	0.25	1.08	0.25	1.08	0.25	1.08	-	-	-	-
A-H2	2.25	9.86	1.90	8.31	0.12	0.54	0.88	1.46	0.17	0.75	0.17	0.75	0.17	0.75	-	-	-	-
I-H1	This source is being deleted with this Permit Renewal Application. Unit is being decommissioned.																	
D-H2	0.24	1.06	0.57	2.49	0.33	1.46	0.26	1.20	0.35	1.51	0.35	1.51	0.35	1.51	-	-	-	-
D-H3	0.30	1.30	0.45	1.95	0.12	0.52	0.38	1.70	0.10	0.44	0.10	0.44	0.10	0.44	-	-	-	-
Z-81-B102	2.64	11.55	5.43	23.77	0.36	1.56	2.53	4.18	0.49	2.15	0.49	2.15	0.49	2.15	-	-	-	-
ESP	33.98	72.50	5880.62	25757.13	5.94	21.00	239.38	1048.48	45.79	98.84	45.79	98.84	45.79	98.84	-	-	-	-
C-H1	11.56	50.61	3.08	13.51	0.42	1.84	2.95	4.88	0.57	2.50	0.57	2.50	0.57	2.50	-	-	-	-
C-H2	5.61	24.58	2.51	11.00	0.16	0.72	1.17	5.10	0.23	1.00	0.23	1.00	0.23	1.00	-	-	-	-
H-F1	2.25	9.88	1.89	8.30	0.12	0.54	0.88	1.46	0.17	0.75	0.17	0.75	0.17	0.75	-	-	-	-
H-F2	1.47	6.42	1.24	5.42	0.09	0.35	0.58	0.95	0.11	0.49	0.11	0.49	0.11	0.49	-	-	-	-
P-H1	4.80	21.04	4.04	17.67	0.26	1.16	1.88	8.20	0.37	1.60	0.37	1.60	0.37	1.60	-	-	-	-
I-H2	This source is being deleted with this Permit Renewal Application. Unit is being decommissioned.																	
D-H1A	0.25	1.10	0.59	2.60	0.04	0.17	0.28	0.14	0.05	0.23	0.05	0.23	0.05	0.23	-	-	-	-
FL-1	42.19	29.44	147.96	103.24	204.05	142.37	9.41	9.37	-	-	-	-	-	-	0.10	0.10	-	-
TV-1	-	-	0.42	1.84	-	-	0.77	3.40	-	-	-	-	-	-	-	-	-	-
TRUCK	-	-	-	-	*	2726.10	-	-	-	-	-	-	-	-	-	-	-	-
TK-R and TK-L	-	-	-	-	*	111.12	-	-	-	-	-	-	-	-	*	1.80	-	-
RAIL	-	-	-	-	*	190.80	-	-	-	-	-	-	-	-	-	-	-	-

Unit No.	NOx		CO		VOC		SOx		TSP[2]		PM10[2]		PM2.5[2]		H_2S		Lead	
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
WWS	-	-	-	-	103.41	452.94	-	-	-	-	-	-	-	-	-	-	-	-
FUG-R	-	-	-	-	*	313.74	-	-	-	-	-	-	-	-	-	-	-	-
FUG-L	-	-	-	-	*	74.70	-	-	-	-	-	-	-	-	-	-	-	-
CT-1/2	-	-	-	-	58.90	26.50	-	-	7.30	32.10	3.50	15.40	0.40	2.00	-	-	-	-
AC-11	This source is being deleted with this Permit Renewal Application.																	
EV-3 and EV-4 (sum)	-	-	-	-	-	-	-	-	0.86	3.78	0.86	3.78	0.86	3.78	-	-	-	-
SM-1	-	-	-	-	-	-	-	-	1.02	4.45	1.02	4.45	0.87	3.82	-	-	-	-
SM-2	-	-	-	-	-	-	-	-	1.02	4.45	1.02	4.45	0.87	3.82	-	-	-	-
AC-12	2.75	12.04	2.53	11.09	0.14	0.63	0.00	0.02	0.14	0.63	0.14	0.63	0.14	0.63	-	-	-	-
GEN-1	4.29	18.79	0.95	4.16	0.12	0.53	0.00	0.02	0.11	0.48	0.11	0.48	0.11	0.48	-	-	-	-
Totals	**188.81**	**595.27**	**6109.16**	**26213.34**	**377.68**	**4082.84**	**269.91**	**1114.63**	**61.38**	**167.24**	**57.58**	**150.54**	**54.18**	**135.88**	**0.10**	**1.90**	**0.00**	**0.00**

Table 2-E: Requested Allowable Emissions

Unit & stack numbering must be consistent throughout the application package. Fill all cells in this table with the emission numbers or a "-" symbol. A “-“ symbol indicates that emissions of this pollutant are not expected. Numbers shall be expressed to at least 2 decimal points (e.g. 0.41, 1.41, or 1.41E^{-4}).

Unit No.	NOx		CO		VOC		SOx		TSP[1]		PM10[1]		PM2.5[1]		H_2S		Lead	
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
Z-81-G104	7.30	31.97	0.96	4.20	0.07	0.29	0.50	2.20	0.21	0.93	0.21	0.93	0.21	0.93	-	-	-	-
Z-81-B104	2.70	11.83	4.26	18.68	0.28	1.23	0.82	3.58	0.39	1.70	0.39	1.70	0.39	1.70	-	-	-	-
Z-81-G105	7.30	31.97	0.96	4.20	0.07	0.29	0.50	2.20	0.21	0.93	0.21	0.93	0.21	0.93	-	-	-	-
Z-81-B105	2.70	11.83	4.26	18.68	0.28	1.23	0.82	3.58	0.39	1.70	0.39	1.70	0.39	1.70	-	-	-	-
Z-81-B106	3.87	16.94	7.96	34.88	0.52	2.28	3.71	6.13	0.72	3.16	0.72	3.16	0.72	3.16	-	-	-	-
G-C1A	11.50	50.37	8.50	37.23	0.35	1.54	0.11	0.50	0.03	0.13	0.03	0.13	0.03	0.13	-	-	-	-
G-C1B	11.08	48.53	8.50	37.23	0.35	1.54	0.11	0.50	0.03	0.13	0.03	0.13	0.03	0.13	-	-	-	-
G-C1C	12.80	56.06	8.50	37.23	0.35	1.54	0.11	0.50	0.03	0.13	0.03	0.13	0.03	0.13	-	-	-	-
P-C1A	This source is being deleted with this Permit Renewal Application.																	
P-C1B	8.66	37.91	8.50	37.23	0.48	2.09	0.16	0.68	0.04	0.18	0.04	0.18	0.04	0.18	-	-	-	-
C-H5	3.09	13.53	1.26	5.52	0.17	0.74	1.21	2.00	0.23	1.02	0.23	1.02	0.23	1.02	-	-	-	-
P-H2	3.23	14.16	1.32	5.78	0.18	0.78	1.27	5.60	0.25	1.08	0.25	1.08	0.25	1.08	-	-	-	-
A-H2	2.25	9.86	1.90	8.31	0.12	0.54	0.88	1.46	0.17	0.75	0.17	0.75	0.17	0.75	-	-	-	-
I-H1	This source is being deleted with this Permit Renewal Application. Unit is being decommissioned.																	
D-H2	0.24	1.06	0.57	2.49	0.33	1.50	0.26	1.20	0.35	1.51	0.35	1.51	0.35	1.51	-	-	-	-
D-H3	0.30	1.30	0.45	1.95	0.12	0.52	0.38	1.70	0.10	0.44	0.10	0.44	0.10	0.44	-	-	-	-
Z-81-B102	2.64	11.55	5.43	23.77	0.36	1.56	2.53	4.18	0.49	2.15	0.49	2.15	0.49	2.15	-	-	-	-
ESP	33.98	72.51	87.26	57.51	5.94	19.51	98.34	68.94	10.77	25.66	10.77	25.66	8.96	21.33	-	-	-	-
C-H1	11.56	50.61	3.08	13.51	0.42	1.84	2.95	4.88	0.57	2.50	0.57	2.50	0.57	2.50	-	-	-	-
C-H2	5.61	24.58	2.51	11.00	0.16	0.72	1.17	5.10	0.23	1.00	0.23	1.00	0.23	1.00	-	-	-	-
H-F1	2.25	9.88	1.89	8.30	0.12	0.54	0.88	1.46	0.17	0.75	0.17	0.75	0.17	0.75	-	-	-	-
H-F2	1.47	6.42	1.24	5.42	0.09	0.35	0.58	0.95	0.11	0.49	0.11	0.49	0.11	0.49	-	-	-	-
P-H1	4.80	21.04	4.04	17.67	0.26	1.16	1.88	8.20	0.37	1.60	0.37	1.60	0.37	1.60	-	-	-	-
I-H2	This source is being deleted with this Permit Renewal Application. Unit is being decommissioned.																	
D-H1A	0.25	1.10	0.59	2.60	0.04	0.17	0.28	0.14	0.05	0.23	0.05	0.23	0.05	0.23	-	-	-	-
FL-1	42.20	29.40	148.00	103.20	204.05	142.37	9.40	9.40	-	-	-	-	-	-	0.10	0.10	-	-
TV-1	-	-	0.42	1.84	-	-	0.77	3.40	-	-	-	-	-	-	-	-	-	-
TRUCK	-	-	-	-	*	36.70	-	-	-	-	-	-	-	-	-	-	-	-
TK-R and TK-L	-	-	-	-	*	111.12	-	-	-	-	-	-	-	-	*	1.80	-	-
RAIL	-	-	-	-	*	1.62	-	-	-	-	-	-	-	-	-	-	-	-

Unit No.	NOx		CO		VOC		SOx		TSP[1]		PM10[1]		PM2.5[1]		H_2S		Lead	
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
WWS	-	-	-	-	*	12.22	-	-	-	-	-	-	-	-	-	-	-	-
FUG-R	-	-	-	-	*	313.74	-	-	-	-	-	-	-	-	-	-	-	-
FUG-L	-	-	-	-	*	74.70	-	-	-	-	-	-	-	-	-	-	-	-
CT-1/2																		
AC-11	This source is being deleted with this Permit Renewal Application.																	
EV-3 and EV-4 (sum)	-	-	-	-	-	-	-	-	0.86	3.78	0.86	3.78	0.86	3.78	-	-	-	-
SM-1	-	-	-	-	-	-	-	-	1.02	4.45	1.02	4.45	0.87	3.82	-	-	-	-
SM-2	-	-	-	-	-	-	-	-	1.02	4.45	1.02	4.45	0.87	3.82	-	-	-	-
AC-12	2.75	12.04	2.53	11.09	0.14	0.63	0.00	0.02	0.14	0.63	0.14	0.63	0.14	0.63	-	-	-	-
GEN-1	4.29	18.79	0.95	4.16	0.12	0.53	4.0E-03	0.02	0.11	0.48	0.11	0.48	0.11	0.48	-	-	-	-
Totals	**188.82**	**595.24**	**315.84**	**513.68**	**215.36**	**735.59**	**128.85**	**135.12**	**16.16**	**49.28**	**16.16**	**49.28**	**14.35**	**44.95**	**0.10**	**1.90**	**0.00**	**0.00**

Table 2-F: Additional Emissions during Startup, Shutdown, and Routine Maintenance (SSM)

☐ This table is intentionally left blank since all emissions at this facility due to routine or predictable startup, shutdown, or scehduled maintenance are no higher than those listed in Table 2-E and a malfunction emission limit is not already permitted or requested. If you are required to report GHG emissions as described in Section 6a, include any GHG emissions during Startup, Shutdown, and/or Scheduled Maintenance (SSM) in Table 2-P. Provide an explanations of SSM emissions in Section 6 and 6a.

All applications for facilities that have emissions during routine our predictable startup, shutdown or scheduled maintenance (SSM)[1], including NOI applications, must include in this table the Maximum Emissions during routine or predictable startup, shutdown and scheduled maintenance (20.2.7 NMAC, 20.2.72.203.A.3 NMAC, 20.2.73.200.D.2 NMAC). In Section 6 and 6a, provide emissions calculations for all SSM emissions reported in this table. Refer to "Guidance for Submittal of Startup, Shutdown, Maintenance Emissions in Permit Applications (https://www.env.nm.gov/aqb/permit/aqb_pol.html) for more detailed instructions. Numbers shall be expressed to at least 2 decimal points (e.g. 0.41, 1.41, or 1.41E-4).

Unit No.	NOx		CO		VOC		SOx		TSP[2]		PM10[2]		PM2.5[2]		H_2S		Lead	
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
Process Vessel	-	-	-	-	160.42	15.06	-	-	-	-	-	-	-	-	-	-	-	-
FCCU Bypass	-	-	156.96	-	-	-	-	-	233.45	-	233.45	-	10.75	-	-	-	-	-
Thiosolv (TV-1) Venting	-	-	-	-	-	-	7.18	2.67E-03	-	-	-	-	-	-	-	-	-	-
Abrasive Blasting	-	-	-	-	-	-	-	-	0.61	0.09	0.09	0.01	0.01	1.30E-03	-	-	-	-
Baker Tanks	-	-	-	-	-	0.59	-	-	-	-	-	-	-	-	-	-	-	-
FL-1	-	-	-	-	-	-	100.27	3.37	-	-	-	-	-	-	1.09	0.08	-	-
Process Vessel	-	-	-	-	4.17	0.14	-	-	-	-	-	-	-	-	3.83	0.13	-	-
Vacuum Trucks	-	-	-	-	1.53	0.85	-	-	-	-	-	-	-	-	-	-	-	-
FUG-R and FUG-L	-	-	-	-	8.90	-	-	-	-	-	-	-	-	-	0.20	0.12	-	-
Surface Coating	-	-	-	-	10.75	-	-	-	0.21	0.01	0.21	0.01	0.21	0.01	-	-	-	-
Tank Degassing	-	-	-	-	8.56	-	-	-	-	-	-	-	-	-	-	-	-	-
Tank Cleaning	-	-	-	-	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-
Tank Landing and Refilling	-	-	-	-	29.73	-	-	-	-	-	-	-	-	-	-	-	-	-
Catalyst Loading	-	-	-	-	-	-	-	-	4.80	0.37	4.80	0.37	4.80	0.37	-	-	-	-
PECS	3.53	0.26	8.81	0.64	8.81	0.64	-	-	-	-	-	-	-	-	-	-	-	-
Heater/Boiler Startup	-	-	63.49	0.87	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Totals	3.53	0.26	229.26	1.51	232.88	17.28	107.45	3.37	239.07	0.47	238.55	0.40	15.77	0.38	5.12	0.33	-	-

[1] **For instance**, if the short term steady-state Table 2-E emissions are 5 lb/hr and the SSM rate is 12 lb/hr, enter 7 lb/hr in this table. If the annual steady-state Table 2-E emissions are 21.9 TPY, and the number of scheduled SSM events result in annual emissions of 31.9 TPY, enter 10.0 TPY in the table below.

[1] **Condensable Particulate Matter:** Include condensable particulate matter emissions for PM10 and PM2.5 if the source is a combustion source. Do not include condensable particulate matter for TSP unless TSP is set equal to PM10 and PM2.5.

Table 2-H: Stack Exit Conditions

Unit and stack numbering must correspond throughout the application package. Include the stack exit conditions for each unit that emits from a stack, including blowdown venting parameters and tank emissions. If the facility has multiple operating scenarios, complete a separate Table 2-H for each scenario and, for each, type scenario name here:

Stack Number	Serving Unit Number(s) from Table 2-A	Orientation (H-Horizontal V=Vertical)	Rain Caps	Height Above	Temp.	Flow Rate		Moisture by	Velocity	Inside Diameter (ft)
			(Yes or No)	Ground (ft)	(F)	(acfs)	(dscfs)	Volume (%)	(ft/sec)	
Z-81-G104	Z-81-G104	V	N	40	400	726.0	N/A	17	57.8	4.0
Z-81-B104	Z-81-B104	V	N	40	400	726.0	N/A	17	57.8	4.0
Z-81-G105	Z-81-G105	V	N	40	400	726.0	N/A	17	57.8	4.0
Z-81-B105	Z-81-B105	V	N	40	400	726.0	N/A	17	57.8	4.0
Z-81-B106	Z-81-B106	V	N	34	650	672.8	N/A	17	53.5	4.0
G-C1A	G-C1A	V	N	45	550	28.4	N/A	5	78.9	1.2
G-C1B	G-C1B	V	N	45	550	28.4	N/A	5	78.9	1.2
G-C1C	G-C1C	V	N	45	550	28.4	N/A	5	78.9	1.2
P-C1A	P-C1A	V	N	21.5	550	44.5	N/A	5	87.7	0.9
P-C1B	P-C1B	V	N	21.5	550	44.5	N/A	5	87.7	0.9
C-H5	C-H5	V	N	121	570	354.9	N/A	17	18.1	5.0
P-H2	P-H2	V	N	110	800	477.5	N/A	17	33.7	4.3
A-H2	A-H2	V	N	86	380	192.9	N/A	17	27.3	3.0
D-H1	D-H1	V	N	50	790	28.7	N/A	17	12.6	1.7
D-H2	D-H2	V	N	69	637	60.0	N/A	10	19.9	2.0
D-H3	D-H3	V	N	76	690	388.7	N/A	10	17.6	2.7
Z-81-B102	Z-81-B102	V	N	40	590	723.5	N/A	17	75.2	3.5
ESP	FCCU, FB-1	V	N	143	650	1630.0	N/A	N/A	130.0	4.0
C-H1	C-H1	V	N	105	550	569.5	N/A	17	37.5	4.4
C-H2	C-H2	V	N	81	1070	535.9	N/A	17	66.6	3.2
H-F1	H-F1	V	N	43.0	790	172.3	N/A	17	17.9	3.5
H-F2	H-F2	V	N	30.0	800	173.7	N/A	17	24.6	3.0
P-H1(A,B)	PH-1	V	N	110	700	326.4	N/A	17	23.0	4.3
D-H1A	D-H1A	V	N	82	582	58.8	N/A	17	12.4	2.5
FL-1	FL-1	V	N	100	1832	405.5	N/A	17	65.6	3.6
TV-1	TV-1	V	Y	42	64	14.3	N/A	40	65	0.53

Stack Number	Serving Unit Number(s) from Table 2-A	Orientation (H-Horizontal V=Vertical)	Rain Caps (Yes or No)	Height Above Ground (ft)	Temp. (F)	Flow Rate (acfs)	Flow Rate (dscfs)	Moisture by Volume (%)	Velocity (ft/sec)	Inside Diameter (ft)
S-V14	S-V14	V	N	16	205	0.1	N/A	99+	~1	0.30
VRU	Truck	V	Y	21	Ambient	2.1	N/A	N/A	355	0.67
TK-R	Tanks at the Refinery	V	Y	Varies	Ambient	N/A	N/A	N/A	N/A	Varies
TK-L	Tanks at the Terminal	V	Y	Varies	Ambient	N/A	N/A	N/A	N/A	Varies
Z-84- T5/F1/F2	Carbon bed	V	N	4	Ambient	N/A	N/A	N/A	N/A	
Z-84-V26 Z-84-V27	Carbon bed	V	N	4	Ambient	N/A	NA	N/A	N/A	
EV-3 and EV-4 (sum)	Wastewater evaporator/sprayer	V	Y				N/A			
SM-1	SM-1	V	Y				N/A			
SM-2	SM-2	V	N				N/A			
AC-12	AC-12	V	N	8	903.2	52.9	N/A	N/A	269	0.50
GEN-1	GEN-1	V	N				N/A			

Table 2-J: Fuel

Specify fuel characteristics and usage. Unit and stack numbering must correspond throughout the application package.

Unit No.	Fuel Type (low sulfur Diesel, ultra low sulfur diesel, Natural Gas, Coal, …)	Fuel Source: purchased commercial, pipeline quality natural gas, residue gas, raw/field natural gas, process gas (e.g. SRU tail gas) or other	Specify Units				
			Lower Heating Value	Hourly Usage	Annual Usage	% Sulfur	% Ash
Z-81-G104 Z-81-G105	Natural Gas	Pipeline quality natural gas	910 Btu/scf	32 MMBtu	308 MMscf	Negl.	Negl.
Z-81-B104 Z-81-B105	Natural Gas	Pipeline quality natural gas	910 Btu/scf	53 MMBtu	500.6 MMscf	Negl.	Negl.
Z-81-B106	Natural Gas	Pipeline quality natural gas	910 Btu/scf	96.7 MMBtu	930.9 MMscf	Negl.	Negl.
	Sweet Refinery Fuel Gas	Process gas	700 Btu/scf		1210.1 MMscf	0.016	Negl.
G-C1A G-C1B G-C1C	Natural Gas	Pipeline quality natural gas	910 Btu/scf	2.9 MMBtu	27.9 MMscf	Negl.	Negl.
	Sweet Refinery Fuel Gas	Process gas	700 Btu/scf		36.3 MMscf	0.016	Negl.
PC1-A	Natural Gas	Pipeline quality natural gas	910 Btu/scf	3.9 MMBtu	37.5 MMscf	Negl.	Negl.
	Sweet Refinery Fuel Gas	Process gas	700 Btu/scf		48.8 MMscf	0.016	Negl.
C-H5	Natural Gas	Pipeline quality natural gas	910 Btu/scf	31.5 MMBtu	303.2 MMscf	Negl.	Negl.
	Sweet Refinery Fuel Gas	Process gas	700 Btu/scf		394.2 MMscf	0.016	Negl.
P-H2	Natural Gas	Pipeline quality natural gas	910 Btu/scf	33 MMBtu	394.2 MMscf	Negl.	Negl.
	Sweet Refinery Fuel Gas	Process gas	700 Btu/scf		48.8 MMscf	0.016	Negl.
A-H2	Natural Gas	Pipeline quality natural gas	910 Btu/scf	23 MMBtu	221.4 MMscf	Negl.	Negl.
	Sweet Refinery Fuel Gas	Process gas	700 Btu/scf		287.8 MMscf	0.016	Negl.
D-H1A	Natural Gas	Pipeline quality natural gas	910 Btu/scf	7.2 MMBtu	69.3 MMscf	Negl.	Negl.
	Sweet Refinery Fuel Gas	Process gas	700 Btu/scf		90.1 MMscf	0.016	Negl.
D-H2	Natural Gas	Pipeline quality natural gas	910 Btu/scf	6.9 MMBtu	66.4 MMscf	Negl.	Negl.
	Sweet Refinery Fuel Gas	Process gas	700 Btu/scf		86.3 MMscf	0.016	Negl.

Unit No.	Fuel Type (low sulfur Diesel, ultra low sulfur diesel, Natural Gas, Coal, …)	Fuel Source: purchased commercial, pipeline quality natural gas, residue gas, raw/field natural gas, process gas (e.g. SRU tail gas) or other	Specify Units				
			Lower Heating Value	Hourly Usage	Annual Usage	% Sulfur	% Ash
D-H3	Natural Gas	Pipeline quality natural gas	910 Btu/scf	9.9 MMBtu	108 MMscf	Negl.	Negl.
	Sweet Refinery Fuel Gas	Process gas	700 Btu/scf		123.9 MMscf	0.016	Negl.
Z-81-B102	Natural Gas	Pipeline quality natural gas	910 Btu/scf	65.9 MMBtu	634.4 MMscf	Negl.	Negl.
	Sweet Refinery Fuel Gas	Process gas	700 Btu/scf		824.7 MMscf	0.016	Negl.
FB-1	FCCU Off gas	Process gas	Varies: Previous apps at 339 Btu/scf	70 MMBtu	613,200 MMBtu	Negl.	Negl.
	Sweet Refinery Fuel Gas	Process gas	Varies: 2010 Average was 765 Btu/scf			0.016	Negl.
C-H1	Natural Gas	Pipeline quality natural gas	910 Btu/scf	77 MMBtu	741.2 MMscf	Negl.	Negl.
	Sweet Refinery Fuel Gas	Process gas	700 Btu/scf		963.6 MMscf	0.016	Negl.
C-H2	Natural Gas	Pipeline quality natural gas	910 Btu/scf	30.5 MMBtu	293.6 MMscf	Negl.	Negl.
	Sweet Refinery Fuel Gas	Process gas	700 Btu/scf		381.7 MMscf	0.016	Negl.
H-F1	Natural Gas	Pipeline quality natural gas	910 Btu/scf	23 MMBtu/hr	221.4 MMscf	Negl.	Negl.
	Sweet Refinery Fuel Gas	Process gas	700 Btu/scf		287.8 MMscf	0.016	Negl.
H-F2	Natural Gas	Pipeline quality natural gas	910 Btu/scf	15 MMBtu	144.4 MMscf	Negl.	Negl.
	Sweet Refinery Fuel Gas	Process gas	700 Btu/scf		187.7 MMscf	0.016	Negl.
P-H1	Natural Gas	Pipeline quality natural gas	910 Btu/scf	49 MMBtu	471.7 MMscf	Negl.	Negl.
	Sweet Refinery Fuel Gas	Process gas	700 Btu/scf		613.2 MMscf	0.016	Negl.
FL-1	Sweet Refinery Fuel Gas	Process gas	700 Btu/scf	14 MMBtu	62.05 MMscf	0.0160	Negl.
AC-12	Diesel	Refinery product fuel	0.138 MMBtu/gal	22.7 gal/hr	113,179 gal/yr	0.0015	Negl.
GEN-1	Diesel	Refinery product fuel	0.138 MMBtu/gal	18.9 gal/hr	165,564 gal/yr	0.0015	Negl.

Table 2-K: Liquid Data for Tanks Listed in Table 2-L

For each tank, list the liquid(s) to be stored in each tank. If it is expected that a tank may store a variety of hydrocarbon liquids, enter "mixed hydrocarbons" in the Composition column for that tank and enter the corresponding data of the most volatile liquid to be stored in the tank. If tank is to be used for storage of different materials, list all the materials in the "All Calculations" attachment, run the newest version of TANKS on each, and use the material with the highest emission rate to determine maximum uncontrolled and requested allowable emissions rate. The permit will specify the most volatile category of liquids that may be stored in each tank. Include appropriate tank-flashing modeling input data. Use additional sheets if necessary. Unit and stack numbering must correspond throughout the application package.

Tank No.	SCC Code	Material Name	Composition	Liquid Density (lb/gal)	Vapor Molecular Weight (lb/lb*mol)	Average Storage Conditions		Max Storage Conditions	
						Temperature (°F)	True Vapor Pressure (psia)	Temperature (°F)	True Vapor Pressure (psia)
Amoco	40301099	Amoco 6606	Amoco 6606 - Diesel Flow Improver	7.80	106.00	50.98	2.4032	59.29	2.8381
AM-TK1	40301099	Amining solution (MDEA)	N-Methyldiethanolamine (MDEA)	8.60	119.16	57.39	0.0002	70.27	0.0002
Chevron	40301099	Gasoline Additive	Chevron additive (OGA 480)	7.40	106.00	50.98	0.0486	59.29	0.0631
Conoco	40301099	Gasoline additive	PHILLIPS Additive (Super Clean)	7.40	107.16	50.98	0.0439	59.29	0.0595
Exxon	40301099	Gasoline additive	EXXON Additive (Paradyne 755)	7.40	106.00	50.98	0.0486	59.29	0.0631
Fire Pump	40301099	Diesel day tank	Diesel #2 - Ciniza	7.10	130.00	59.81	0.0073	74.43	0.0103
Mobil	40301099	Gasoline additive	MOBIL Additive (MTT 246)	7.40	106.00	50.98	0.0486	59.29	0.0631
O.C. Diesel	40301099	Diesel fuel for plant use	Diesel #2 - Ciniza	7.10	130.00	50.98	0.0048	59.29	0.0072
O.C. Gasoline	40301099	Gasoline for plant use	Gasoline (87 Oct. Base) - Ciniza	5.82	67.00	50.98	4.1571	59.29	4.9162
Shell	40301099	Gasoline additive (HiTEC 6442)	HiTEC 6442 Gasoline Additive	7.62	106.00	50.98	0.0486	59.29	0.0631
SWS-TK1	40301099	Sour water	Sour water	8.28	28.70	57.39	0.7127	70.27	0.9048
Texaco	40301099	Gasoline additive (TFA-4908R)	TEXACO Additive (System 3, TFA-4908R)	7.35	106.00	50.98	0.0486	59.29	0.0631
Total	40301099	Gasoline additive	TOTAL Additive (Lubrizol 8192)	7.40	106.00	50.98	0.0486	59.29	0.0631
Western	40301099	Gasoline Additive	HiTEC 3023 Gasoline Additive	8.08	106.00	50.98	0.0486	59.29	0.0631
T-1	40301099	Diesel storage tank	Diesel #2 - Ciniza	7.10	130.00	50.98	0.0048	59.29	0.0072
T-2	40301197	High-octane base gasoline	Gasoline (89 Oct. Base) - Ciniza	5.86	67.00	50.98	3.9637	59.29	4.6921
T-3	40301197	Mid-octane base gasoline	Gasoline (87 Oct. Base) - Ciniza	5.82	67.00	50.98	4.1571	59.29	4.9162
T-4	40301197	Low-octane base gasoline	Gasoline (83 Oct. Base) - Ciniza	5.80	67.00	50.98	4.1571	59.29	4.9162
T-5	40301099	Ethanol Blendstock	Ethanol Blendstock	6.55	46.10	57.39	0.6004	70.27	0.9275
T-6	40301197	Lt. Cat. Gasoline	Light Cat. Gasoline - Ciniza	6.20	67.00	57.39	3.3859	70.27	4.4353
T-7	40301197	Biodiesel	Gallup Biodiesel	7.03	116.00	50.98	0.0038	59.29	0.0057
T-8	40301197	Biodiesel	Gallup Biodiesel	7.03	116.00	50.98	0.0038	59.29	0.0057
T-27	40301197	Wastewater tank	Recovered Oil - Ciniza	6.32	91.65	57.39	0.7478	70.27	1.1082
T-28	40301197	Wastewater tank	Recovered Oil - Ciniza	6.32	91.65	57.39	0.7478	70.27	1.1082
T-101	40301197	Crude Oil	Crude Oil (Four Corners Sweet)	6.35	60.00	54.19	4.4375	64.78	5.3652
T-102	40301197	Crude Oil	Crude Oil (Four Corners Sweet)	6.35	60.00	54.19	4.4375	64.78	5.3652
T-105	40301099	Recovered oil	Recovered Oil - Ciniza	7.00	105.00	57.39	0.7478	70.27	1.1082
T-106	40301099	Diesel	Diesel #2 - Ciniza	7.10	130.00	50.98	0.0048	59.29	0.0072
T-107	40301099	Recovered oil	Recovered Oil - Ciniza	7.00	91.65	50.98	0.7487	59.29	0.9255
T-108	40301197	Alkylate	Alkylate	5.90	75.00	50.98	3.1882	59.29	3.7713
T-111	40301099	ultra low sulfur diesel	Diesel #2 - Ciniza	7.10	130.00	50.98	0.0048	59.29	0.0072
T-112	40301099	ultra low sulfur diesel	Diesel #2 - Ciniza	7.10	130.00	57.39	0.0066	70.27	0.0091
T-115	40301099	Distillate	Distillate - Ciniza	7.00	130.00	57.39	0.0066	70.27	0.0091
T-116	40301099	ultra low sulfur diesel	Diesel #2 - Ciniza	7.10	130.00	100.00	0.0220	100.00	0.0220
T-225	40301099	Distillate	Distillate - Ciniza	7.00	130.00	57.39	0.0066	70.27	0.0091
T-226	40301099	Kerosene	Kerosene - Ciniza	6.80	130.00	57.39	0.0078	70.27	0.0111
T-227	40301099	Kerosene	Kerosene - Ciniza	6.80	130.00	57.39	0.0078	70.27	0.0111
T-228	40301099	Kerosene	Kerosene - Ciniza	6.80	130.00	57.39	0.0078	70.27	0.0111

Tank No.	SCC Code	Material Name	Composition	Liquid Density (lb/gal)	Vapor Molecular Weight (lb/lb*mol)	Average Storage Conditions		Max Storage Conditions	
						Temperature (°F)	True Vapor Pressure (psia)	Temperature (°F)	True Vapor Pressure (psia)
T-231	40301099	Recovered Oil	Recovered Oil - Ciniza	7.00	105.00	57.39	0.7478	70.27	1.1082
T-232	40301099	Recovered Oil	Recovered Oil - Ciniza	7.00	125.06	50.98	1.0331	59.29	1.2837
T-235	40301099	Diesel	Diesel #2 - Ciniza	7.10	130.00	50.98	0.0048	59.29	0.0072
T-337	40301197	Naphtha	Naphtha - Ciniza	6.30	75.00	57.39	0.5428	70.27	0.7590
T-338	40301099	Naphtha	Naphtha - Ciniza	6.30	75.00	57.39	0.5428	70.27	0.7590
T-339	40301099	Naphtha	Naphtha - Ciniza	6.30	75.00	57.39	0.5428	70.27	0.7590
T-342	40301099	Ethanol blendstock	Ethanol Blendstock	6.55	46.10	50.98	0.4791	59.29	0.6413
T-343	40301099	Ethanol Blendstock	Ethanol Blendstock	6.55	46.10	50.98	0.4791	59.29	0.6413
T-344	40301197	Reformate	Reformate - Ciniza	6.54	75.0	57.39	1.6309	70.27	2.1699
T-345	40301197	Reformate	Reformate - Ciniza	6.54	75.00	57.39	1.6309	70.27	2.1699
T-567	40301197	Low octane base gasoline	Gasoline (83 Oct. Base) - Ciniza	5.80	67.00	54.19	4.4374	64.78	5.4761
T-568	40301099	Ammonium thiosulfate	Ammonium thiosulfate	11.10	52.39	57.39	0.2559	70.27	0.3640
T-569	40301197	Low-octane base gasoline	Gasoline (83 Oct. Base) - Ciniza	5.80	67.00	57.39	4.7329	70.27	6.0861
T-570	40301197	Mid-octane base gasoline	Gasoline (87 Oct. Base) - Ciniza	5.82	67.00	54.19	4.4374	64.78	5.4761
T-571	40301197	Mid-octane base gasoline	Gasoline (87 Oct. Base) - Ciniza	5.82	67.00	57.39	4.7329	70.27	6.0861
T-572	40301197	Mid-octane base gasoline	Gasoline (87 Oct. Base) - Ciniza	5.82	67.00	57.39	4.7329	70.27	6.0861
T-574	40301197	Straight run gasoline	Straight Run Gasoline - Ciniza	5.60	62.00	57.39	4.1204	70.27	5.4454
T-575	40301099	Kerosene	Kerosene - Ciniza	6.80	130.00	57.39	0.0078	70.27	0.0111
T-576	40301197	Light cat. crack gasoline	Light Cat. Gasoline - Ciniza	6.20	67.00	57.39	3.3859	70.27	4.4353
T-577	40301099	Diesel	Diesel #2 - Ciniza	7.10	130.00	57.39	0.0066	70.27	0.0091
T-579	40301099	Diesel	Diesel #2 - Ciniza	7.10	130.00	57.39	0.0066	70.27	0.0091
T-581	40301197	Lt. Cycle Oil	LCO - Ciniza	7.30	130.00	54.19	0.0057	64.78	0.0082
T-582	40301197	High-octane base gasoline	Gasoline (89 Oct. Base) - Ciniza	5.86	67.00	57.39	4.5162	70.27	5.8162
T-583	40301099	Diesel	Diesel #2 - Ciniza	7.10	130.00	57.39	0.0066	70.27	0.0091
T-701	40301099	FCC feed	FCC Feed - Ciniza	7.50	180.00	150.00	0.0738	150.00	0.0738
T-702	40301099	FCC Feed	FCC Feed - Ciniza	7.50	180.00	57.91	0.0079	71.16	0.0115
T-703	40301099	Recovered Oil/FCC Feed	Recovered Oil - Ciniza	7.00	105.00	57.39	0.7478	70.27	1.1082
T-704	40301099	Recovered Oil	Recovered Oil - Ciniza	7.00	105.00	57.39	0.7478	70.27	1.11
T-705	40301099	Recovered Oil	Recovered Oil - Ciniza	7.00	105.00	57.91	0.7581	71.16	1.1349
T-706	40301099	Fuel Oil	Fuel Oil - Ciniza	8.50	180.00	175.00	0.0113	175.00	0.0113
T-707	40301099	Recovered oil	Recovered Oil - Ciniza	7.00	105.00	57.39	0.7478	70.27	1.1082
T-714	40301099	FCC feed	FCC Feed - Ciniza	7.50	180.00	100.00	0.0241	100.00	0.0241
T-716	40301099	Ammonium thiosulfate	Ammonium thiosulfate	11.10	52.39	57.39	0.2559	70.27	0.3640
Z-83-T3	40301099	Sulfuric Acid	Sulfuric Acid	15.30	98.08	58.95	0.0002	72.94	0.0002
Z-81-T9	40301099	Diesel day tank	Diesel #2 - Ciniza	7.10	130.00	50.98	0.0048	59.29	0.0072
Z-81-T13	40301099	Emerg.gen.diesel day tank	Diesel #2 - Ciniza	7.10	130.00	54.79	0.0059	65.82	0.0083
Z-81-T14	40301099	Emerg.gen.diesel day tank	Diesel #2 - Ciniza	7.10	130.00	50.98	0.0048	59.29	0.0072
Z-81-T15	40301099	Emerg. air comp. diesel tank	Diesel #2 - Ciniza	7.10	130.00	50.98	0.0048	59.29	0.0072
Z-84-T35	40301197	Wastewater tank	Wastewater	5.60	67.00	54.79	4.1576	65.82	5.1645

Table 2-L: Tank Data

Include appropriate tank-flashing modeling input data. Use an addendum to this table for unlisted data categories. Unit and stack numbering must correspond throughout the application package. Use additional sheets if necessary. See reference Table 2-L2. Note: 1.00 bbl = 10.159 M3 = 42.0 gal

Tank No.	Date Installed	Materials Stored	Seal Type (refer to Table 2-LR below)	Roof Type (refer to Table 2-LR below)	Capacity		Diameter (M)	Vapor Space (M)	Color (from Table VI-C)		Paint Condition (from Table VI-C)	Annual Throughput (gal/yr)	Turn-overs (per year)
					(bbl)	(M^3)			Roof	Shell			
Amoco	1965	Amoco 6606	N/A	FX	4	0.6	0.9	Horizontal	N/A	OT (Tan)	Good	600	4
AM-TK1	1984	Amining solution (MDEA)	N/A	FX	60	9.5	1.8	1.8	OT (Tan)	OT (Tan)	Good	7,500	3
Chevron	1965	Gasoline Additive	N/A	FX	238	37.9	3.0	4.3	OT (Tan)	OT (Tan)	Good	6,500	0.7
Conoco	1987	Gasoline additive	N/A	FX	24	3.8	1.2	Horizontal	N/A	WH	Good	200	0.2
Exxon	1974	Gasoline additive	N/A	FX	36	5.7	1.2	Horizontal	N/A	OT (Tan)	Good	20,000	13
Fire Pump	1969	Diesel day tank	N/A	FX	12	1.9	1.2	Horizontal	N/A	OT (Tan)	Good	500	1
Mobil	1993	Gasoline additive	N/A	FX	190	30.3	2.4	Horizontal	N/A	WH	Good	3,500	0.4
O.C. Diesel	1957	Diesel fuel for plant use	N/A	FX	71	11.4	1.5	Horizontal	N/A	OT (Tan)	Good	20,000	6
O.C. Gasoline	1957	Gasoline for plant use	N/A	FX	71	11.4	1.5	Horizontal	N/A	OT (Tan)	Good	30,000	10
Shell	1963	Gasoline additive (HiTEC 6442)	N/A	FX	190	30.3	2.4	Horizontal	N/A	WH	Good	2,600	0.3
SWS-TK1	2006	Sour Water	Mechanical Shoe	IF	931	159.3	4.7	N/A	OT (Tan)	OT (Tan)	Good	25,242,000	600
Texaco	1989	Gasoline additive (TFA-4908R)	N/A	FX	48	7.6	1.5	Horizontal	N/A	WH	Good	5,200	3
Total	1991	Gasoline additive	N/A	FX	190	30.3	2.4	Horizontal	N/A	OT (Tan)	Good	1,800	0.2
Western	1982	Gasoline Additive	N/A	FX	238	37.9	3.0	3.4	OT (Tan)	OT (Tan)	Good	26,000	3
T-1	1965	Diesel storage tank	N/A	FX	3,000	477.0	9.1	3.7	OT (Tan)	OT (Tan)	Good	90,000,000	714
T-2	1965	High-octane base gasoline	Liquid- mounted	IF	4,000	635.9	9.1	N/A	OT (Tan)	OT (Tan)	Good	20,000,000	119
T-3	1965	Mid-octane base gasoline	Liquid- mounted	IF	4,000	635.9	9.1	N/A	OT (Tan)	OT (Tan)	Good	160,000,000	952
T-4	1970	Low-octane base gasoline	Liquid- mounted	IF	4,000	635.9	9.1	N/A	OT (Tan)	OT (Tan)	Good	83,000,000	494
T-5	1963	Ethanol Blendstock	N/A	FX	1,802	291.9	7.6	3.0	OT (Tan)	OT (Tan)	Good	7,500,000	97
T-6	1963/1998	Lt. Cat. Gasoline	Mechanical Shoe	IF	1,800	286.2	6.7	N/A	OT (Tan)	OT (Tan)	Good	475,000	6
T-7	2011	Biodiesel tank	Liquid- mounted	FX	2,000	318.0	N/A	N/A	TBD	TBD	Good	65,700	0.8
T-8	2011	Biodiesel tank	Liquid- mounted	IF	2,000	318.0	7.3	N/A	TBD	TBD	Good	65,700	0.8
T-27	1995	Wastewater tank	Vapor- mounted	IF	5,000	794.9	11.9	N/A	OT (Tan)	OT (Tan)	Good	700,000	3
T-28	1995	Wastewater tank	Vapor- mounted	IF	5,000	794.9	11.9	N/A	OT (Tan)	OT (Tan)	Good	700,000	3
T-101	1957	Crude Oil	Mechanical Shoe	IF	80,000	12718.9	33.5	N/A	OT (Tan)	OT (Tan)	Good	246,813,000	73
T-102	1991	Crude Oil	Mechanical Shoe	EF	80,000	12718.9	33.5	N/A	N/A	OT (Tan)	Good	246,813,000	73

Tank No.	Date Installed	Materials Stored	Seal Type (refer to Table 2-LR below)	Roof Type (refer to Table 2-LR below)	Capacity		Diameter (M)	Vapor Space (M)	Color (from Table VI-C)		Paint Condition (from Table VI-C)	Annual Throughput (gal/yr)	Turn-overs (per year)
					(bbl)	(M^3)			Roof	Shell			
T-105	1957	Recovered oil	N/A	FX	254	40.4	3.4	2.1	OT (Tan)	OT (Tan)	Good	1,400,000	131
T-106	1957	Diesel	N/A	FX	5,000	794.9	10.2	4.9	OT (Tan)	OT (Tan)	Good	5,000,000	24
T-107	1957	Recovered oil	N/A	EF	5,000	794.9	10.2	3.7	OT (Tan)	OT (Tan)	Good	1,400,000	7
T-108	1957/1992	Alkylate	Mechanical Shoe	IF	5,000	794.9	10.2	N/A	OT (Tan)	OT (Tan)	Good	32,000,000	152
T-111	1957	ultra low sulfur diesel	N/A	FX	5,000	794.9	10.2	3.7	OT (Blue Grey)	OT (Blue Grey)	Good	13,800,000	66
T-112	1957	ultra low sulfur diesel	N/A	FX	5,000	794.9	10.2	4.9	OT (Tan)	OT (Tan)	Good	13,800,000	66
T-115	1957	Distillate	N/A	FX	5,000	794.9	10.2	3.7	OT (Tan)	OT (Tan)	Good	31,700,000	151
T-116	1957	ultra low sulfur diesel	N/A	FX	5,000	794.9	10.2	3.7	OT (Tan)	OT (Tan)	Good	31,700,000	151
T-225	1957	Distillate	N/A	FX	25,000	3974.7	20.4	3.0	OT (Tan)	OT (Tan)	Good	45,000,000	43
T-226	1957	Kerosene	N/A	FX	25,000	3974.7	20.4	3.0	OT (Tan)	OT (Tan)	Good	3,700,000	4
T-227	1957	Kerosene	N/A	FX	5,000	794.9	10.2	3.7	OT (Tan)	OT (Tan)	Good	17,600,000	84
T-228	1957	Kerosene	N/A	FX	5,000	794.9	10.2	3.7	OT (Tan)	OT (Tan)	Good	17,600,000	84
T-231	1957	Recovered Oil	N/A	IF	5,000	794.9	10.2	4.9	OT (Tan)	OT (Tan)	Good	5,100,000	24
T-232	1957	Recovered Oil	N/A	FX	5,000	794.9	10.2	4.9	OT (Tan)	OT (Tan)	Good	5,100,000	24
T-235	1957	Diesel	N/A	IF	5,000	794.9	10.2	4.9	OT (Tan)	OT (Tan)	Good	5,100,000	24
T-337	1977/1989	Naphtha	Mechanical Shoe	IF	20,000	3179.7	18.3	N/A	OT (Tan)	OT (Tan)	Good	2,700,000	3
T-338	1964	Naphtha	Mechanical Shoe	IF	25,000	3974.7	20.4	N/A	N/A	OT (Tan)	Good	92,000,000	88
T-339	1957	Naphtha	Mechanical Shoe	EF or IF	25,000	3974.7	20.4	N/A	N/A	OT (Tan)	Good	92,000,000	88
T-342	1957	Ethanol blendstock	N/A	FX	5,000	794.9	10.2	3.7	OT (Tan)	OT (Tan)	Good	700,000	3
T-343	1957	Ethanol Blendstock	N/A	FX	5,000	794.9	10.2	3.7	OT (Tan)	OT (Tan)	Good	700,000	3
T-344	2014	Reformate, Naphtha	Mechanical Shoe	EF	22,700	3603.7	18.3	N/A	N/A	White	Good	92,000,000	93
T-345	1977/1989	Reformate	Mechanical Shoe	IF	20,000	3338.7	18.3	N/A	OT (Tan)	OT (Tan)	Good	2,800,000	3
T-567	1969/2006	Sour Naphtha	Liquid- mounted	EF	20,000	3179.7	18.3	N/A	N/A	OT (Tan)	Good	42,000,000	50
T-568	1957	Ammonium Thiosulfate	N/A	FX	2,100	333.9	7.6	3.7	OT (Tan)	OT (Tan)	Good	465,000	6
T-569	1957/1997	Low-octane base gasoline	Mechanical Shoe	EF	25,000	3974.7	20.4	N/A	OT (Tan)	OT (Tan)	Good	42,000,000	40
T-570	1957	Mid-octane base gasoline	Mechanical Shoe	EF	25,000	3974.7	20.4	N/A	N/A	OT (Tan)	Good	53,000,000	50
T-571	1957/2004	Mid-octane base gasoline	Mechanical Shoe	EF	25,000	3974.7	20.4	N/A	N/A	OT (Tan)	Good	53,000,000	50
T-572	1957/2004	Mid-octane base gasoline	Mechanical Shoe	EF	25,000	3974.7	20.4	N/A	OT (Tan)	OT (Tan)	Good	53,000,000	50

Tank No.	Date Installed	Materials Stored	Seal Type (refer to Table 2-LR below)	Roof Type (refer to Table 2-LR below)	Capacity		Diameter (M)	Vapor Space (M)	Color (from Table VI-C)		Paint Condition (from Table VI-C)	Annual Throughput (gal/yr)	Turn-overs (per year)
					(bbl)	(M^3)			Roof	Shell			
T-574	1968/2005	Straight run gasoline	Mechanical Shoe	EF	40,000	6359.5	25.9	N/A	N/A	OT (Tan)	Good	29,700,000	18
T-575	1957	Kerosene	N/A	FX	8,000	1271.9	13.0	3.0	OT (Tan)	OT (Tan)	Good	3,699,998	11
T-576	1968/1997	Light cat. crack gasoline	Mechanical Shoe	EF	40,000	6359.5	25.9	N/A	N/A	OT (Tan)	Good	67,000,000	40
T-577	1957	Diesel	N/A	FX	10,000	1589.9	13.0	4.6	OT (Tan)	OT (Tan)	Good	43,000,000	102
T-579	1957	Diesel	N/A	FX	20,000	3179.7	18.3	3.0	OT (Tan)	OT (Tan)	Good	43,000,000	51
T-581	1957/1993	Lt. Cycle Oil	Vapor- mounted	IF	25,000	3974.7	20.4	N/A	OT (Tan)	OT (Tan)	Good	2,300,000	2
T-582	1957/2006	High-octane base gasoline	Mechanical Shoe	IF	25,000	3974.7	20.4	N/A	OT (Tan)	OT (Tan)	Good	20,000,000	19
T-583	1996	Diesel	N/A	FX	55,000	8744.3	30.5	6.1	OT (Tan)	OT (Tan)	Good	58,000,000	25
T-701	1963	FCC feed	N/A	FX	37,000	5882.5	27.0	2.7	OT (Tan)	OT (Tan)	Good	28,000,000	18
T-702	1963	FCC Feed	N/A	FX	52,200	3974.7	20.4	6.4	OT (Greenish turquoise)	OT (Greenish turquoise)	Good	28,000,000	27
T-703	1963	FCC feed	N/A	FX	25,000	3959.5	20.4	1.5	LG	LG	Good	28,000,000	27
T-704	1963	Recovered oil	N/A	FX	10,000	1589.9	14.3	4.9	LG	LG	Good	1,200,000	3
T-705	1963	Recovered oil	N/A	FX	10,000	1589.9	14.3	4.9	OT(Tan)	OT(Tan)	Good	1,200,000	3
T-706	1963	Fuel Oil	N/A	FX	10,000	1589.9	14.3	2.1	OT (Greenish turquoise)	OT (Greenish turquoise)	Good	1,200,000	3
T-707	1963	Recovered oil	N/A	FX	1,700	270.3	8.2	0.9	OT	OT	Good	90,000	1
T-714	1969	FCC feed	N/A	FX	29,000	4611.0	22.4	3.0	LG	LG	Good	28,000,000	23
T-716	2006	Ammonium Thiosulfate	N/A	FX	1,002	159.3	4.7	2.7	OT	OT	Good	730,789	17
Z-83-T3	2002	Sulfuric Acid	N/A	FX	238	42.3	3.0	3.0	OT (Tan)	OT (Tan)	Good	5,018	0.5
Z-81-T9	1974	Diesel day tank	N/A	FX	60	9.5	1.8	Horizontal	N/A	OT (Tan)	Good	1,000	0.4
Z-81-T13	1989	Emerg.gen.diesel day tank	N/A	FX	11	1.8	1.2	0.3	OT (Tan)	OT (Tan)	Good	56,000	117
Z-81-T14	1989	Emerg.gen.diesel day tank	N/A	FX	12	1.9	1.2	Horizontal	OT (Tan)	OT (Tan)	Good	7,000	14
Z-81-T15	1989	Emerg. air comp. diesel tank	N/A	FX	90	14.4	1.8	Horizontal	OT (Tan)	OT (Tan)	Good	56,000	15
Z-84-T35	2010	Wastewater tank	Mechanical Shoe	IF	27,234	4,329.9	23.8	N/A	AS	AS	Good	262,800,000	230

Table 2-L2: Liquid Storage Tank Data Codes Reference Table

Roof Type	Seal Type, Welded Tank Seal Type		Seal Type, Riveted Tank Seal Type		Roof, Shell Color	Paint Condition
	Mechanical Shoe Seal	**Liquid-mounted resilient seal**	**Vapor-mounted resilient seal**	**Seal Type**		
FX: Fixed Roof					**WH**: White	Good
IF: Internal Floating Roof	**A**: Primary only	**A**: Primary only	**A**: Primary only	**A**: Mechanical shoe, primary only	**AS**: Aluminum (specular)	Poor
EF: External Floating Roof	**B**: Shoe-mounted secondary	**B**: Weather shield	**B**: Weather shield	**B**: Shoe-mounted secondary	**AD**: Aluminum (diffuse)	
P: Pressure	**C**: Rim-mounted secondary	**C**: Rim-mounted secondary	**C**: Rim-mounted secondary	**C**: Rim-mounted secondary	**LG**: Light Gray	
					MG: Medium Gray	
					BL: Black	
					OT: Other (specify)	

Note: 1.00 bbl = 0.159 M^3 = 42.0 gal

Table 2-M: Materials Processed and Produced (Use additional sheets as necessary.)

Material Processed				Material Produced			
Description	**Chemical Composition**	**Phase (Gas, Liquid, or Solid)**	**Quantity (specify units)**	**Description**	**Chemical Composition**	**Phase**	**Quantity (specify units)**
Crude Oil/Recovered Oil	See analysis in Section 7 of NSR application for permit 0633-M8.	Liquid	~ 32,200 BPD	Motor Gasolines	See analysis in Section 7 of NSR application for permit 0633-M8.	Liquid	~ 20,100 BPD
Natural Gasoline	See analysis in Section 7 of NSR application for permit 0633-M8.	Liquid	~ 6,700 BPD	Kerosene, Kerosene-based Fuels	See analysis in Section 7 of NSR application for permit 0633-M8.	Liquid	~ 2,700 BPD
Isobutane	See analysis in Section 7 of NSR application for permit 0633-M8.	Liquid	~1,100 BPD	Diesel/Biodiesel Fuel	See analysis in Section 7 of NSR application for permit 0633-M8.	Liquid	~ 7,300 BPD
Butane	See analysis in Section 7 of NSR application for permit 0633-M8.	Liquid	~ 500 BPD	Jet-A Jet Fuel	See analysis in Section 7 of NSR application for permit 0633-M8.	Liquid	~ 400 BPD
Ethanol Blendstock	See analysis in Section 7 of NSR application for permit 0633-M8.	Liquid	~ 2,000 BPD	JP-8 Jet Fuel	See analysis in Section 7 of NSR application for permit 0633-M8.	Liquid	~ 2,200 BPD
Misc. Fuel Additives	See analysis in Section 7 of NSR application for permit 0633-M8.	Liquid	~100 BPD	Propane/LPG	See analysis in Section 7 of NSR application for permit 0633-M8.	Gas/Liquid	~ 650 BPD
				Fuel Oil	See analysis in Section 7 of NSR application for permit 0633-M8.	Liquid	~ 600 BPD
				Fuels produced and consumed on site	Refinery gas; FCC coke	Gas/Liquid	~ 1,200 BPD
				Excess Naphtha Loaded to Railcar	See analysis in Section 7 of NSR application for permit 0633-M8.	Liquid	~ 493 BPD

Table 2-N: CEM Equipment

Enter Continuous Emissions Measurement (CEM) Data in this table. If CEM data will be used as part of a federally enforceable permit condition, or used to satisfy the requirements of a state or federal regulation, include a copy of the CEM's manufacturer specification sheet in the Information Used to Determine Emissions attachment. Unit and stack numbering must correspond throughout the application package. Use additional sheets if necessary.

Stack No.	Pollutant(s)	Manufacturer	Model No.	Serial No.	Sample Frequency	Averaging Time	Range	Sensitivity	Accuracy
FB-1	NOx	Teledyne TAPI	200 EM	194	1/s	10/80 s rolling	0-40/150 ppm	40 ppb	0.5% full scale
FB-1	SO2	Teledyne TAPI	100 EH	140	1/s	6/30 s	0-50/1500 ppm	0.1 ppm	0.5% full scale
FB-1	O2	Servomex	X4900C1	652825	500-1500 ml/min	60 s	0-25%	<0.1%	< 0.5%
FB-1	CO	Servomex	X4900C1	652825	500- 1500 ml/min	60 s	0-100/1000 ppm	Standard / high	2 ppm / <1%
FB-1	PM (Opacity)	Thermo Electron Corp.	440	440-3-79516-B18/411	1 sec	6 min rolling	0-100%	±1%	±1%
FL-1	H2S	Yokogawa	GC8000	92N00062	200 ms	1 hr	0-300 ppm 0-10,000 ppm	1 ppm	±1% full scale
FL-1	Total Sulfur	ThermoScientific	SOLA II	TBD	TBD	1 hr	0 - 2,000 ppmv 0 - 200,000 ppmv	Not defined	1% of full scale
FL-1	Vent Gas Composition	Yokogawa	GC8000	92R400039	600 s	15 min	See MACT CC Continuous Parameter Monitoring Plan. Range, sensitivity, and accuracy depend on component.		
Refinery Fuel Gas System	H2S	Rosemount	500R	9007720/21	1 s	1 hr	0-1500 ppm	3 ppm	0.0005
Truck Rack VRU	VOC	John Zink	1R8400D	2682	1s	1 hr	0 to 2%	1000 ppm	±2% of Reading
FCCU Regen	NOx	Teledyne	M200EM	425	1/s	10/80 s rolling	0-40/150 ppm	40 ppb	0.5% full scale
FCCU Regen	O2	Siemens	Oxymat GE	N1-A3-860	0.3-1 l/min	60 s	0-25%	<0.1%	<0.5%

Table 2-P: Greenhouse Gas Emissions

Applications submitted under 20.2.70, 20.2.72, & 20.2.74 NMAC are required to complete this Table. Power plants, Title V major sources, and PSD major sources must report and calculate all GHG emissions for each unit. Applicants must report potential emission rates in short tons per year (see Section 6.a for assistance). Include GHG emissions during Startup, Shutdown, and Scheduled Maintenance in this table. For minor source facilities that are not power plants, are not Title V, or are not PSD, there are three options for reporting GHGs 1) report GHGs for each individual piece of equipment; 2) report all GHGs from a group of unit types, for example report all combustion source GHGs as a single unit and all venting GHG as a second separate unit; OR 3) check the following box ☐ By checking this box, the applicant acknowledges the total CO2e emissions are less than 75,000 tons per year.

		CO_2 ton/yr	N_2O ton/yr	CH_4 ton/yr	SF_6 ton/yr	PFC/HFC ton/yr[2]									Total GHG Mass Basis ton/yr[4]	Total CO_2e ton/yr[5]
Unit No.	**GWPs [1]**	**1**	**298**	**25**	**22,800**	**footnote 3**										
No changes are proposed for GHG emissions from any source. Previous represented GHG emissions are provided for reference.																
GP-NG	**mass GHG**	341531.9	0.64	6.4											341539	
	CO_2e	341531.9	191.8	160.9												341884.7
GP-RFG	**mass GHG**	274220.8	3.3	16.7											274240.9	
	CO_2e	274220.8	998.3	418.6												275637.7
AC-12	**mass GHG**	2236.6	0.018	0.091											2236.7	
	CO_2e	2236.6	5.4	2.3												2244.3
Subpart Y - Petroleum Refineries																
FL-1	**mass GHG**	47637.5	0.48	143.8											47781.8	
	CO_2e	47637.5	142	3594.8												51374.3
FCCU	**mass GHG**	103569.4	0.61	3											103573	
	CO_2e	103569.4	180.7	75.8												103825.9
Sulferox SRU	**mass GHG**	108.9	0	0											108.9	
	CO_2e	108.9	0	0												108.9
SWAATS SRU	**mass GHG**	364.6	0	0											364.6	
	CO_2e	364.6	0	0												364.6
Equipment Leaks	**mass GHG**	0	0	14.3											14.3	
	CO_2e	0	0	358.3												358.3
Storage Tanks	**mass GHG**	0	0	1.2											1.2	
	CO_2e	0	0	30.6												30.6
Loading Operations	**mass GHG**	0	0	0.033											0.033	
	CO_2e	0	0	0.83												0.83
Gen-1	**mass GHG**	1862.2	0.015	0.076											1862.3	
	CO_2e	1862.2	4.5	1.9												1868.6
PECS	**mass GHG**	2	3.7E-05	3.7E-06											2	
	CO_2e	2	9.24E-04	1.10E-03												2
	mass GHG															
	CO_2e															
	mass GHG															
	CO_2e															
Total	**mass GHG**														771724.8	
	CO_2e															777700.6

[1] **GWP** (Global Warming Potential): Applicants must use the most current GWPs codified in Table A-1 of 40 CFR part 98. GWPs are subject to change, therefore, applicants need to check 40 CFR 98 to confirm GWP values.

[2] For **HFCs** or **PFCs** describe the specific HFC or PFC compound and use a separate column for each individual compound.

[3] For each new compound, enter the appropriate GWP for each HFC or PFC compound from Table A-1 in 40 CFR 98.

[4] Green house gas emissions on a **mass basis** is the ton per year green house gas emission before adjustment with its GWP.

[5] **CO_2e** means Carbon Dioxide Equivalent and is calculated by multiplying the TPY mass emissions of the green house gas by its GWP.

Section 3

Application Summary

The **Application Summary** shall include a brief description of the facility and its process, the type of permit application, the applicable regulation (i.e. 20.2.72.200.A.X, or 20.2.73 NMAC) under which the application is being submitted, and any air quality permit numbers associated with this site. If this facility is to be collocated with another facility, provide details of the other facility including permit number(s). In case of a revision or modification to a facility, provide the lowest level regulatory citation (i.e. 20.2.72.219.B.1.d NMAC) under which the revision or modification is being requested. Also describe the proposed changes from the original permit, how the proposed modification will affect the facility's operations and emissions, de-bottlenecking impacts, and changes to the facility's major/minor status (both PSD & Title V).

Routine or predictable emissions during Startup, Shutdown, and Maintenance (SSM): Provide an overview of how SSM emissions are accounted for in this application. Refer to "Guidance for Submittal of Startup, Shutdown, Maintenance Emissions in Permit Applications (http://www.env.nm.gov/aqb/permit/app_form.html) for more detailed instructions on SSM emissions.

Western Refining Southwest, Inc. (Western) owns and operates the Western Gallup Refinery. As of October 1, 2018, Western became a subsidiary of Marathon Petroleum Corporation (Marathon). The facility is currently authorized under NSR Permits 0633-M16-R1 and Title V Permit P021-R3. Title V Permit P021-R3 was issued on October 16, 2017 and incorporated all NSR actions 0633-M7R4 through 0633-M13-M14R1. This application is being submitted for a renewal to the current Title V permit in accordance with 20.2.70.300.B.2 NMAC, which requires a timely application be submitted at least 12 months prior to the expiration date of the current Title V permit.

The table below is a summary of the permit actions to be incorporated into the current Title V permit P021-R3:

Summary of requested updates to Title V Permit P021-R3		
Permit Action	**Issue Date**	**Description**
NSR Significant Revision 0633-M17	Pending (Submitted October 22, 2018)	Updating SSM emission limits fo FCCU control (ESP) bypass operations as required by Special Condition A117
NSR Significant Revision 0633-M16/M16R1	December 6, 2018	Requested updates to several unit to comply with US EPA Tier 3 vehicle fuel regulations, the gasoline pool (excluding CARB and exported gasoline) must meet an annual average sulfur concentration of 10 ppm. The following is a brief summary of the changes: 1) Changes to the FCCU unit included the replacement of the existing fin fan and water coolers; 2) All portions of the ISOM unit excluding the BENSAT column were decommissioned; 3) Fugitive emissions (FUG-R) increased to account for the additional piping components needed for the modification of the existing Fluidized Catalytic Cracking Unit (FCCU) and Naphtha Hydrotreater (NHT) unit; 4) Increased the capacity of the Thiosolv/SWAATS unit [unit TV-1] to accommodate the acid gas generated from the sulfur reduction of the gasoline pool; 5) Increased the maximum and average vapor pressure and temperature for tanks T-574 and T-576; 6) Increased the stack heights of units H-F1 and H-F2 and replace some of the tubing and pig or replace the convection bundle of unit H-F1.
Administrative Revision NSR Permit 0633-M16R1	Submitted to NMED on December 3, 2018 Incorporated into 0633-M16/M16R1 at issuance on December 6, 2018	Requested the replacement of AC-12 with an identical unit.
NSR Significant Revision 0633-M15	February 22, 2018	This permit application incorporated the following: 1) Increases in the permitted 12-month rolling FCCU feed throughput to 9,200 bpd; 2) Increases to the hourly allowable emissions and decreases to the annual allowable emissions for the electrostatic precipitator (unit ESP); 3) Addition of the new PECS (a vapor combustion unit), GEN-1 (diesel portable generator), and AC-12 (backup diesel air compressor) units; 4) Reduction of both hourly and annual NOx allowable limits for compressor engines P-C1B, G-C1A, G-C1B, and G-C1C based on stack test results; 5) Increases in VOC emissions from the tanks due to increase in FCCU feed, 6) Removal air compressors AC-11 and P-C1A; and 7) Addition of existing SSM emission limits for CO for the heaters and boilers.

Summary of requested updates to Title V Permit P021-R3		
Permit Action	**Issue Date**	**Description**
Administrative Revision NSR Permit 0633-M13, M14R3	July 26, 2017	Requested the addition of two (2) firewater pumps, powered by diesel engines. The firewater pumps qualified for an exemption under 20.2.72.202.A(4) NMAC.

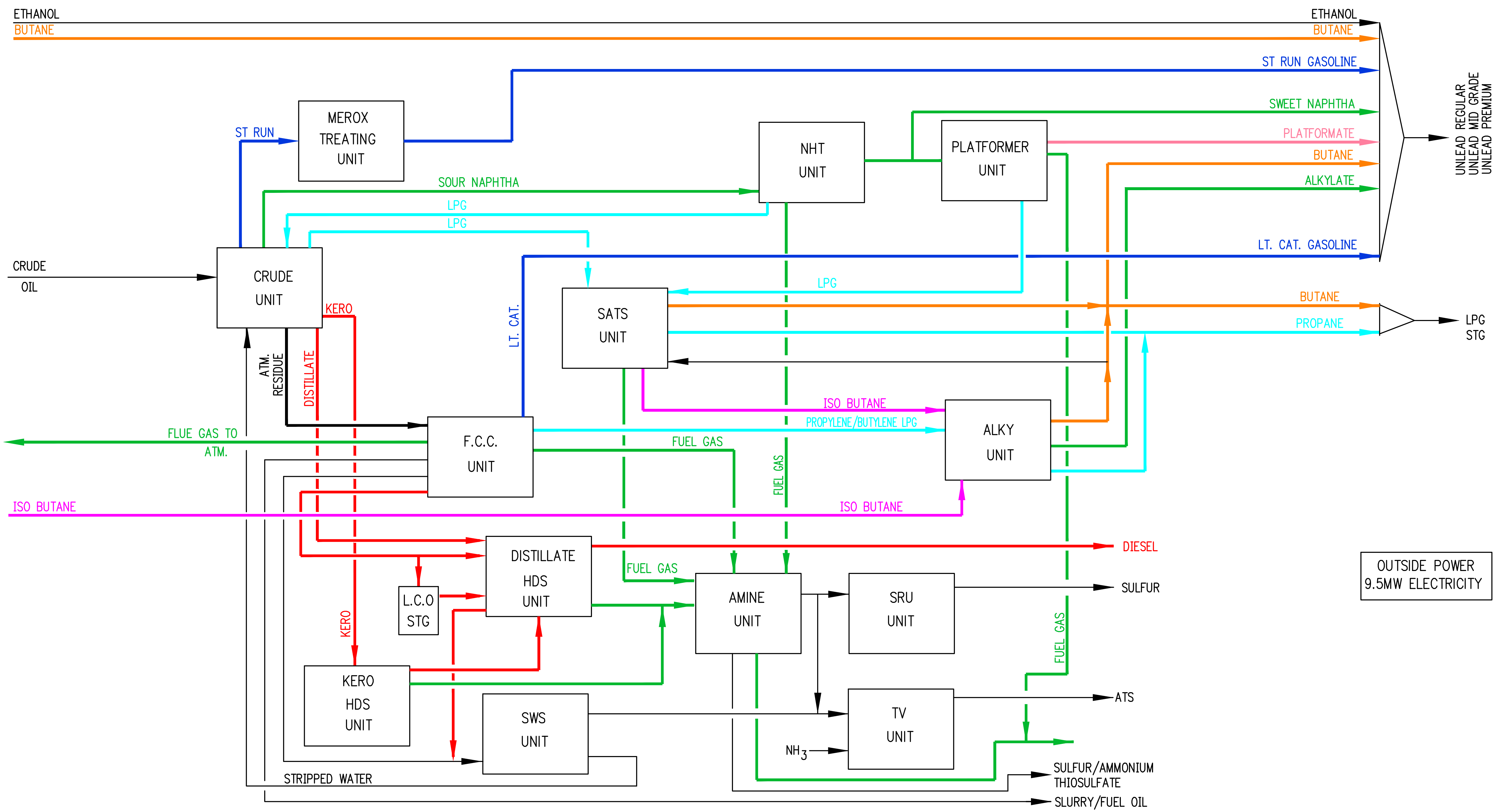
The required sections of the Universal Application form set for Title V renewal applications are included with this submission. Additional sections relevant to the requested revisions are also included. No other changes are requested in this application.

Section 4

Process Flow Sheet

A **process flow sheet** and/or block diagram indicating the individual equipment, all emission points and types of control applied to those points. The unit numbering system should be consistent throughout this application.

The process flow sheet has been attached.



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1)
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REFERENCE DWGS.	REV NO.	REVISION DESCRIPTION	JOB No.	DRAWN BY	DRAWN DATE	CHECKED BY	CHECKED DATE	APPROVED BY	APPROVED DATE
	4	COLOR CODED PER ALLEN SCHULT		TFB	8-9-18				
	3	AS-BUILT PER ALLEN Schult.		TFB	6-26-18				

SCALE: NONE
DATE
DRAWN BY: RVG 7-1-05
CHK'D BY:
APP'D. BY:
ENGINEER:
AFE NUM:
MOC NUM:

PLANT BLOCK FLOW DIAGRAM

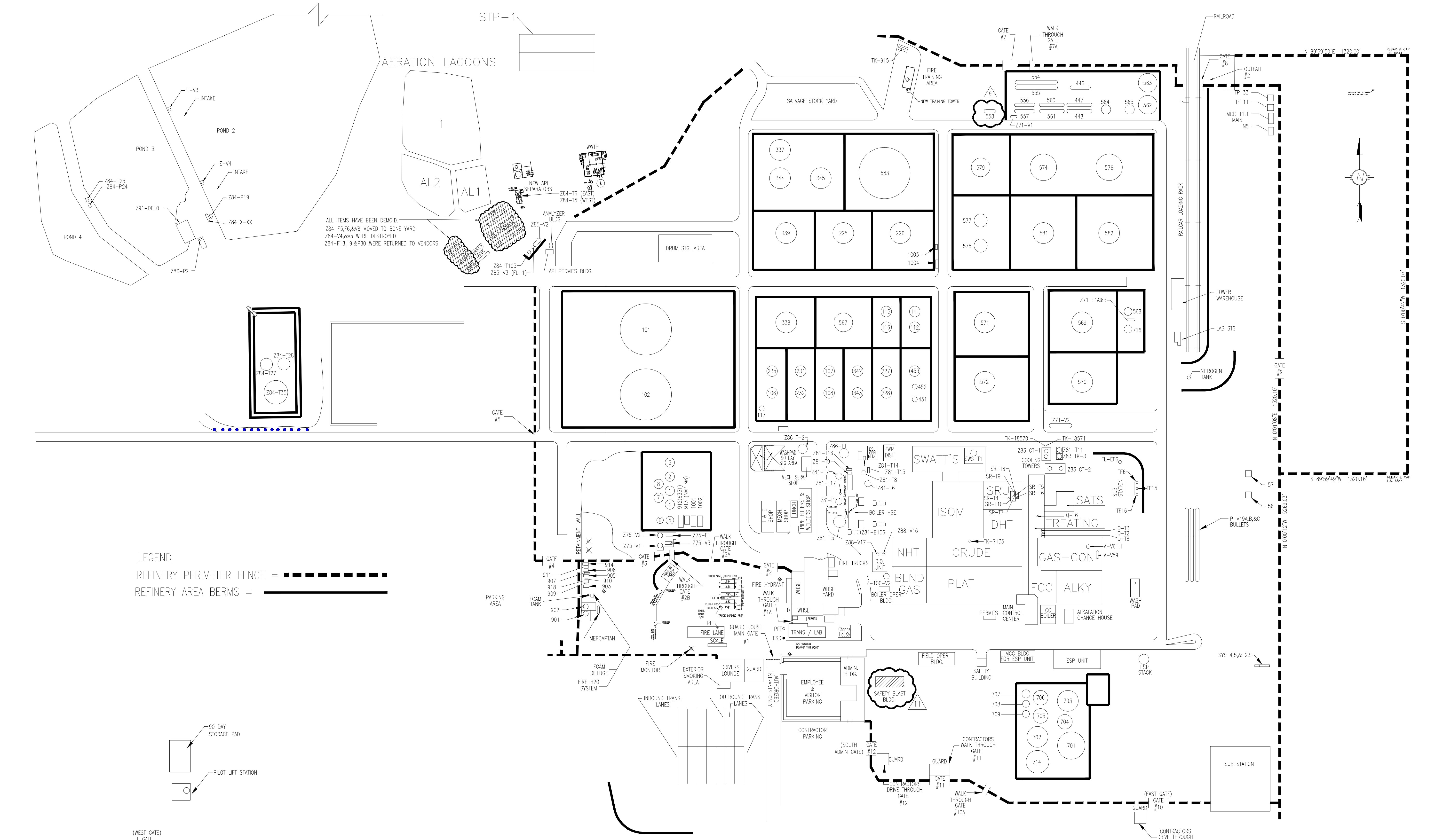
DWG. FILE NAME: AZ-32-107
DWG. NO. AZ-32-107
REV. 4

Section 5

Plot Plan Drawn To Scale

A **plot plan drawn to scale** showing emissions points, roads, structures, tanks, and fences of property owned, leased, or under direct control of the applicant. This plot plan must clearly designate the restricted area as defined in UA1, Section 1-D.12. The unit numbering system should be consistent throughout this application.

The Plot Plan has been attached.



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1) –
2) –
3) –
4) –
5) –
6) –

REFERENCE DWGS.	REV NO.	REVISION DESCRIPTION	JOB No.	DRAWN BY	DRAWN DATE	CHECKED BY	CHECKED DATE	APPROVED BY	APPROVED DATE
–	10	BOILER & FIELD OPERATIONS BUILDINGS ADDED.	–	NHB	8/22/18	–	–	–	–
–	9	AS-BUILT NEW T-558	–	AJA	4/11/17	–	–	–	–
–	8	ADDED POND 4 AND EVAPORATOR EQUIPMENT	–	CG	09/04/15	–	–	–	–
–	7	DRAWING NUMBER CHANGED FROM Z-01-126 TO Z-35-126	–	CG	02/04/14	–	–	–	–
–	6	ESP UNIT ADDED	–	CG	04/10/13	–	–	–	–
–	5	REVISED AS NOTED	----	–	9/29/12	–	–	–	–
–	11	ADDED SAFETY BLAST BLDG. PER MOC# 2018-REFINERY-141	---	TFB	8/23/18	–	–	–	–

SCALE: NONE	DATE
DRAWN BY: CLM	11/11/98
CHK'D BY: –	–
APP'D. BY: –	–
ENGINEER: –	
AFE NUM: –	
MOC NUM: –	

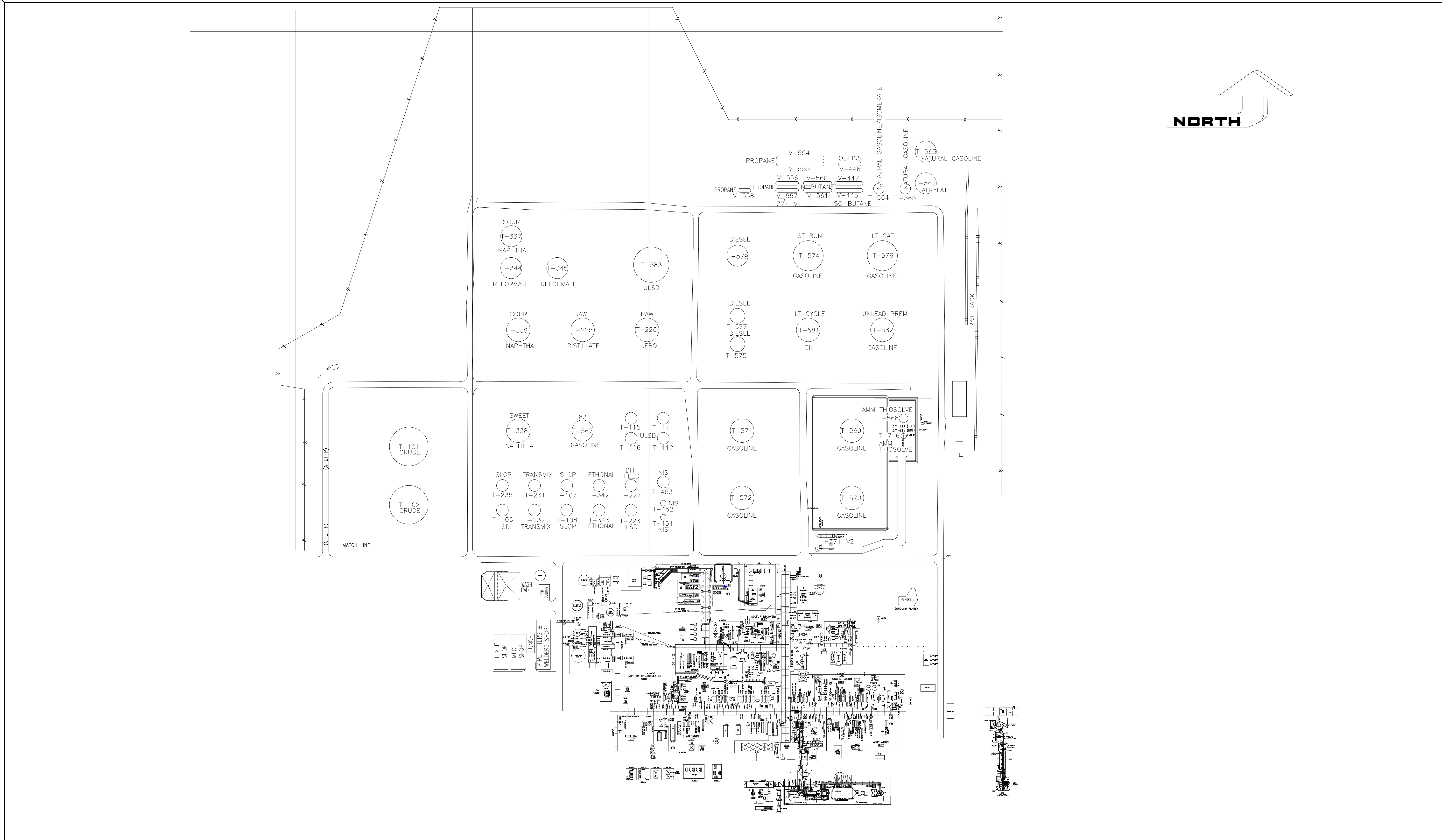
PLANT LAYOUT

Western Refining
GALLUP REFINERY

DWG. FILE NAME: Z-35-126

DWG. NO. Z-35-126

REV. 11



NOTES

NO.	REVISION	JOB No.	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE
27	AS-BUILT NEW TK-558		AJA	4/11/17				
26	REMOVED TV-B2 & TV-V3 MOC# SRU-SWAATS-2013-011		CG	11/29/16				
25	FIELD VERIFIED LOCATIONS OF A-P10 & A-P13.1		CG	8/11/16	CG	8/11/16	CG	8/11/16
24	A-V60.3 INSTALLED		NHB	4/28/16	NHB	4/28/16	NHB	4/28/16
23	DEMOED H-V6		AJA	3/16/16				

REFERENCE DWGS.

	DATE
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CHK'D BY: NONE	NONE
APP'D. BY: NONE	NONE
ENGINEER: NONE	
RFE NUM: NONE	
MOC NUM: NONE	

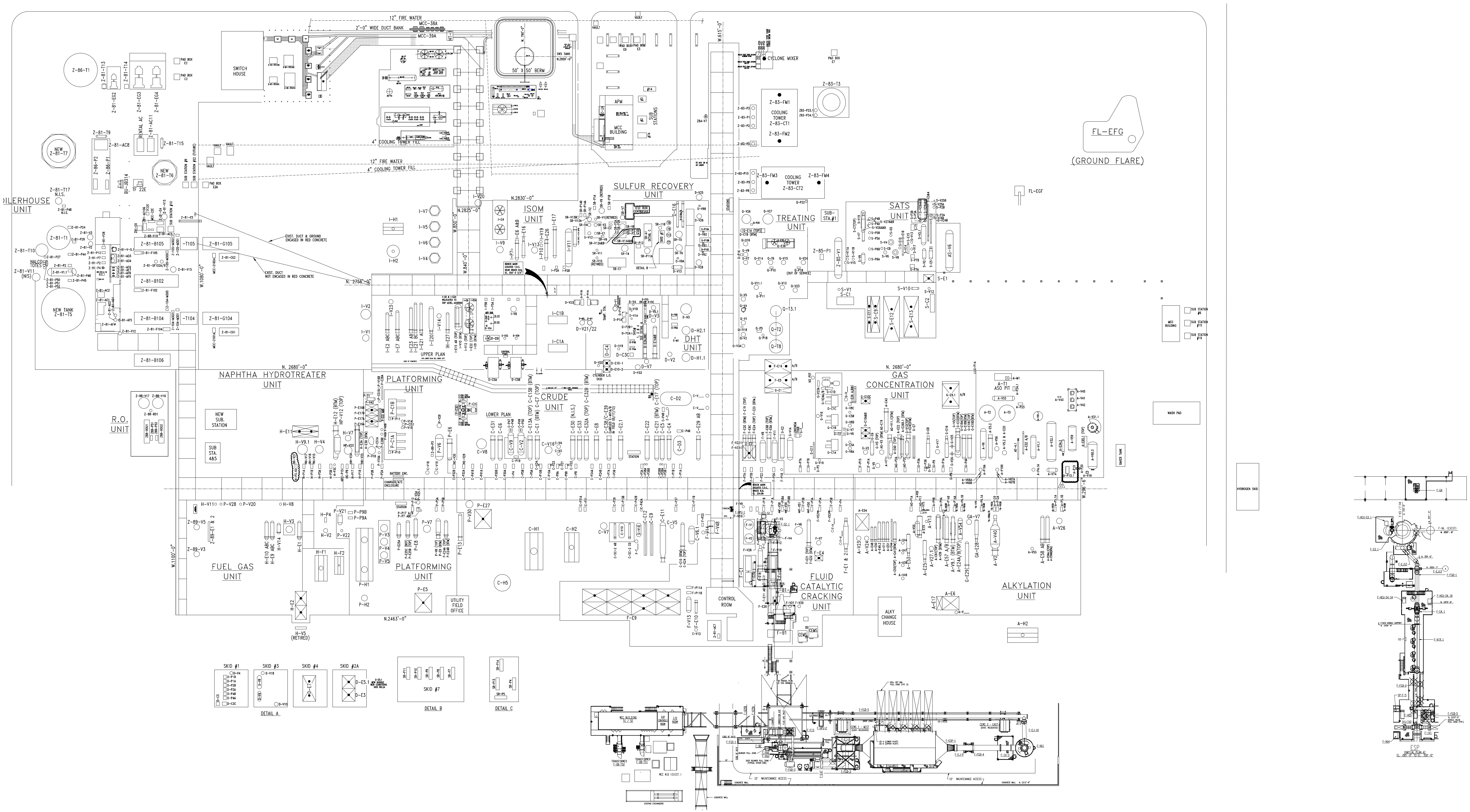
MASTER EQUIPMENT PLOT PLAN

Western Refining
GALLUP REFINERY

DWG. FILE NAME: Z-35-104

DWG. NO. Z-35-104

REV. 27



BOILERHOUSE UNIT
SWITCH HOUSE
12" FIRE WATER
2'-0" WIDE DUCT BANK
4" COOLING TOWER FILL
50' X 50' BERM
APM
MCC BUILDING
SUB STATIONS
CYCLONE MIXER
COOLING TOWER
FL-EFG
(GROUND FLARE)
SULFUR RECOVERY UNIT
ISOM UNIT
TREATING UNIT
SATS UNIT
DHT UNIT
NAPHTHA HYDROTREATER UNIT
PLATFORMING UNIT
CRUDE UNIT
GAS CONCENTRATION UNIT
R.O. UNIT
NEW SUB. STATION
SUB STA. 4&5
FUEL GAS UNIT
PLATFORMING UNIT
UTILITY FIELD OFFICE
CONTROL ROOM
FLUID CATALYTIC CRACKING UNIT
ALKY CHANGE HOUSE
ALKYLATION UNIT
MCC BUILDING
WASH PAD
HYDROGEN SKID
NEW TANK Z-81-T5
N. 2680'-0"
N. 2463'-0"
SKID #1
SKID #3
SKID #4
SKID #2A
SKID #7
DETAIL A
DETAIL B
DETAIL C

Section 6

All Calculations

Show all calculations used to determine both the hourly and annual controlled and uncontrolled emission rates. All calculations shall be performed keeping a minimum of three significant figures. Document the source of each emission factor used (if an emission rate is carried forward and not revised, then a statement to that effect is required). If identical units are being permitted and will be subject to the same operating conditions, submit calculations for only one unit and a note specifying what other units to which the calculations apply. All formulas and calculations used to calculate emissions must be submitted. The "Calculations" tab in the UA2 has been provided to allow calculations to be linked to the emissions tables. Add additional "Calc" tabs as needed. If the UA2 or other spread sheets are used, all calculation spread sheet(s) shall be submitted electronically in Microsoft Excel compatible format so that formulas and input values can be checked. Format all spread sheets and calculations such that the reviewer can follow the logic and verify the input values. Define all variables. If calculation spread sheets are not used, provide the original formulas with defined variables. Additionally, provide subsequent formulas showing the input values for each variable in the formula. All calculations, including those calculations are imbedded in the Calc tab of the UA2 portion of the application, the printed Calc tab(s), should be submitted under this section.

Tank Flashing Calculations: The information provided to the AQB shall include a discussion of the method used to estimate tank-flashing emissions, relative thresholds (i.e., NOI, permit, or major source (NSPS, PSD or Title V)), accuracy of the model, the input and output from simulation models and software, all calculations, documentation of any assumptions used, descriptions of sampling methods and conditions, copies of any lab sample analysis. If Hysis is used, all relevant input parameters shall be reported, including separator pressure, gas throughput, and all other relevant parameters necessary for flashing calculation.

SSM Calculations: It is the applicant's responsibility to provide an estimate of SSM emissions or to provide justification for not doing so. In this Section, provide emissions calculations for Startup, Shutdown, and Routine Maintenance (SSM) emissions listed in the Section 2 SSM and/or Section 22 GHG Tables and the rational for why the others are reported as zero (or left blank in the SSM/GHG Tables). Refer to "Guidance for Submittal of Startup, Shutdown, Maintenance Emissions in Permit Applications (http://www.env.nm.gov/aqb/permit/app_form.html) for more detailed instructions on calculating SSM emissions. If SSM emissions are greater than those reported in the Section 2, Requested Allowables Table, modeling may be required to ensure compliance with the standards whether the application is NSR or Title V. Refer to the Modeling Section of this application for more guidance on modeling requirements.

Glycol Dehydrator Calculations: The information provided to the AQB shall include the manufacturer's maximum design recirculation rate for the glycol pump. If GRI-Glycalc is used, the full input summary report shall be included as well as a copy of the gas analysis that was used.

Road Calculations: Calculate fugitive particulate emissions and enter haul road fugitives in Tables 2-A, 2-D and 2-E for:

1. If you transport raw material, process material and/or product into or out of or within the facility and have PER emissions greater than 0.5 tpy.
2. If you transport raw material, process material and/or product into or out of the facility more frequently than one round trip per day.

Significant Figures:
A. All emissions standards are deemed to have at least two significant figures, but not more than three significant figures.
B. At least 5 significant figures shall be retained in all intermediate calculations.
C. In calculating emissions to determine compliance with an emission standard, the following rounding off procedures shall be used:

- **(1)** If the first digit to be discarded is less than the number 5, the last digit retained shall not be changed;
- **(2)** If the first digit discarded is greater than the number 5, or if it is the number 5 followed by at least one digit other than the number zero, the last figure retained shall be increased by one unit; **and**
- **(3)** If the first digit discarded is exactly the number 5, followed only by zeros, the last digit retained shall be rounded upward if it is an odd number, but no adjustment shall be made if it is an even number.
- **(4)** The final result of the calculation shall be expressed in the units of the standard.

Control Devices: In accordance with 20.2.72.203.A(3) and (8) NMAC, 20.2.70.300.D(5)(b) and (e) NMAC, and 20.2.73.200.B(7) NMAC, the permittee shall report all control devices and list each pollutant controlled by the control device regardless if the applicant takes credit for the reduction in emissions. The applicant can indicate in this section of the application if they chose to not take credit for the reduction in emission rates. For notices of intent submitted under 20.2.73 NMAC, only uncontrolled emission rates can be considered to determine applicability unless the state or federal Acts require the control. This information is necessary to determine if federally enforceable conditions are necessary for the control device, and/or if the control device produces its own regulated pollutants or increases emission rates of other pollutants.

Emissions generated at the Gallup Refinery include the following:

- Nitrogen oxides (NO_x)
- Carbon monoxide (CO)
- Sulfur dioxide (SO_2)
- Volatile Organic Compounds (VOCs)
- Total suspended particulates (TSP)
- Particulate matter with an aerodynamic diameter of less than 10 microns (PM_{10})
- Particulate matter with an aerodynamic diameter of less than 2.5 microns ($PM_{2.5}$)
- Federal Hazardous Air Pollutants (HAPs)
- New Mexico Toxic Air Pollutants (TAPs)
- Greenhouse Gases (GHGs)

Emission units/activities at the Gallup Refinery include the following:

- Heaters, Boilers, and Cogeneration Units (Turbine/Boiler)
- Reciprocating internal combustion engines (RICE)
- Process Flare
- Fluidized Catalytic Cracking Unit (FCCU)
- Loading /Unloading Operations
- Wastewater System
- Storage Tanks
- Process Fugitives
- Cooling Towers
- Startup, Shutdown, Maintenance (SSM)

Calculations for NSR Permits yet to be Incorporated into the Title V Permit

Emissions calculations are addressed below for the NSR permits not incorporated into current Title V permit P021-R3.

NSR Permit 0633-M17

FCCU BYPASS CO, TSP, PM10, and PM2.5 EMISSIONS (unit FCCU Bypass)

During bypass events, the short-term CO, TSP, PM10, and PM2.5 emissions from the regenerator cannot be controlled by the CO boiler and ESP. As a result, the short-term emissions are higher than the current permitted limits that are established for emissions under normal operations. Under MACT UUU, the Refinery Sector Rule provides an alternative limit for organic HAP (based on CO concentrations) during SSM events, which is maintaining a minimum O2 concentration at 1% in the regenerator flue gas. During the SSM event with the bypassing of the CO Boiler, Gallup will comply with the alternative limit and expect higher short- term CO emissions. There are no changes to the CO emissions limit for FCCU control device bypass events in Table 107.A proposed in this project. Therefore, CO emissions are not recalculated in this submission.

The hourly TSP emission rate during SSM events is calculated using the stack test from July 2018 for the FCCU (when the ESP was operational). The controlled TSP emissions measured during the stack test were used to back out precontrol TSP emissions by using a theoretical calculated collection efficiency for the ESP that is representative of how the ESP was operating during the 2018 stack test. The same calculation method is then applied to calculate PM10 and PM2.5 emissions.

ESP collection efficiency was determined for TSP, PM10, and PM2.5 using equations found in *Zevenhoven & Kilpinen, 2001*. Each control efficiency was calculated incrementally for varying particle sizes (for both operating conditions evaluated in the 2018 stack test) in increments of half a micrometer, creating 20 ranges of micrometers (0-0.5, 0.5-1, 1-1.5 etc). The collection efficiencies calculated for each increment between 0-2.5 micrometers were averaged to determine a collection efficiency for the ESP for PM2.5. The 2.5-10 micrometer range was calculated and then applied to the filterable PM10 emissions test. The filterable PM2.5, PM10 and condensable PM emission rate from the July 2018 stack test was used to determine the precontrol emissions. By applying the calculated control efficiencies to the stack test data from July 2018 the uncontrolled emissions rate can be calculated. The PM2.5 uncontrolled emission rate is the sum of filterable PM2.5 and condensable PM. The PM10 emission rate is the sum of the calculated precontrol filterable PM2.5, condensable PM, and the filterable PM10 emissions. Detailed calculations for uncontrolled emission rate calculations can be found in Section 7. The Coke Burn Emission factor for both controlled and uncontrolled emissions was calculated from stack test operational conditions and applied to the maximum design FCCU coke burn rate of 7,610 lb coke/hr to obtain potential TSP, PM10, and PM2.5 emission rates during FCCU emission control bypass events. Western requests that the emission limits calculated in this section be based on 3-hour rolling averages since the results from the 2018 stack test that are used in this demonstration are the average of three separate (approximately) one-hour tests.

See Section 7 for complete permit application, including referenced method documents.

NSR Permit 0633-M16/M16R1

Fugitives Associated with the Fluidized Catalytic Cracking Unit, Naphtha Hydrotreater, and BENSAT (unit FUG-R)
Fugitive emissions from the facility will be updated with this application to include the fugitive components associated with the changes to the Fluidized Catalytic Cracking unit (FCCU), Naphtha Hydrotreater unit (NHT), and the BENSAT unit. A 5% increase in flange/connector components for the NHT unit and a 10% increase in flange/connection components for the FCCU have been incorporated. Additionally, the fugitive components associated with the ISOM unit will be removed from the emissions estimate, as all portions of the ISOM unit excluding the BENSAT column will be decommissioned. Finally, the emission factors used to calculate fugitives from the agitator seals associated with the Tank Farm have been updated to be more representative of emissions at the facility based on the LeakDAS Equation Set Details Report, dated June 6, 2018. The fugitive emissions are calculated using the updated component counts and emission factors from EPA Protocol for Equipment Leak Emission Estimates, 1995.

ThioSolv SWAATS Unit (unit TV-1)
Emissions from the ThioSolv SWAATS unit are calculated using vent gas overhead stream properties. This update will increase the acid gas feed rate to the SWAATS unit to accommodate the acid gas generated from the sulfur reduction of the gasoline pool.

Venting Emissions during ThioSolv SWAATS Unit Shutdown (unit TV-1 (SSM))
Venting emissions from the ThioSolv SWAATS unit during shutdown events are calculated using the vent gas volume and overhead stream properties. This update will increase the acid gas feed rate to the SWAATS unit to accommodate the acid gas generated from the sulfur reduction of the gasoline pool.

Storage Tanks (units T-574 and T-576; part of unit TK-R)
Emissions from these units are calculated using the tank properties, throughputs, and the Trinity Tank Emissions Calculation Tool. With this application, more recent vapor pressure data is being used in the tank emission calculation.

NSR Permit 0633-M15

FCCU, FB-1, ESP
The fluidized catalytic cracking unit (FCCU) at Gallup refinery has a regenerator section with full-burn capability (may operate in partial-burn burn mode depending on FCCU throughput) . The CO-laden regenerator off-gas is sent to a CO boiler (FB-1) to control CO emissions and generate steam and then sent to an electrostatic precipitator (ESP) to control PM emissions. ESP emissions therefore result from two distinct sources: FCCU Regenerator section and CO boiler combustion of FCCU regenerator off gas with refinery fuel gas or natural gas.

In January 2015, Western submitted a technical revision application for the ESP to propose NOx emission limits using 2014 data as required by the Second Amended SFO (dated May 24, 2012). The annual NOx emission rate was based on a 365-day NOx concentration of 65 ppmvd and an average stack flowrate of 35,010 dscfm. The average stack flowrate in this 2015 application was based on the average of 2014 stack flowrate data with a 50% safety factor added to it. For this present application, Western has concluded that the permitted average stack flowrate and 365-day NOx concentration are conservative enough for the proposed increase in FCCU throughput. Hence, Western is not requesting a change to the annual NOx emission rate.

The calculation methodology for hourly NOx emissions for unit ESP is updated in NSR 0633-M15. The hourly NOx emission rate is calculated using the maximum historical stack flowrate and a maximum 1-hr NOx concentration. The maximum stack flowrate was determined by analyzing 2016 and 2017 (January through June) process data and adding a 25% safety factor. The maximum NOx 1-hr concentration (100 ppmv) was established by analyzing 2016 and 2017 (January through June) process data and adding a safety factor of 25% to this maximum value.

The calculation methodology for hourly and annual CO emissions for unit ESP is also updated in NSR 0633-M15. The hourly CO emission rate is calculated using the maximum historical stack flowrate (as discussed above) and a maximum 1-hr CO concentration of 422 ppmv. The maximum 1-hr CO concentration value was established by reviewing the FCCU's highest CO concentrations during normal operations from 2015 through 2017 (January through June) and adding a 100% safety factor to the maximum CO concentration value from this period. The annual CO emission rate is calculated using the average stack flowrate and an annual average CO concentration of 85 ppmv. Western evaluated the FCCU's annual average CO concentrations from 2015 through 2017 to determine this annual average concentration. A 200% safety factor is added to the maximum of the annual average concentrations from 2015 through 2017. Due to the updated calculation methodology in NSR 0633-M15, proposed annual and hourly CO emission rates decreased when compared to current permit limits.

Hourly and annual VOC emissions are based on a VOC emission factor of 18.29 ppmv. This factor is unchanged from the permitted VOC emission calculation prior to NSR 0633-M15. Due to updated flowrates, hourly VOC emissions increased and annual VOC emissions decreased when compared to current permit limits.

With this throughput increase in NSR 0633-M15, Western does not foresee any changes in the SO2 concentration for the FCCU. However, with this application, the calculation methodology for hourly SO2 emissions is being updated. The hourly SO2 emission rate is calculated using the maximum stack flowrate and a maximum 1-hr SO2 concentration of 208 ppmv. The maximum 1-hr SO2 concentration value was established by evaluating 2016 and 2017 (January through June) FCCU data. A 25% safety factor is incorporated into this value. The annual SO2 emission rate is calculated using the average stack flow rate and a 365-day average SO2 concentration of 44 ppmv. The 365-day average concentration was estimated using an average from 2016 and 2017 (January through June) data, along with the addition of a 25% safety factor.

The calculation methodology for hourly and annual TSP, PM10 and PM2.5 emission for unit ESP are updated with NSR 0633-M15. Hourly TSP, PM10, and PM2.5 emissions are calculated using a filterable PM factor of 1.0 lb PM/1000 lb coke burned (limit that is specified in the 01/22/09 Amended Order), and a condensable PM factor of 0.0027 gr/dscf. The condensable PM emission factor was obtained by taking the average of 2016 and 2017 test results. The coke burn rate was calculated using an equation from MACT UUU, 40 CFR 63.1564(b)(4)(i). The maximum air blower flowrate used in this equation was calculated using the maximum air blower flowrate in 2017, with an added 10% safety factor. The condensable PM factor of 0.0027 gr/dscf was established using 2016 and 2017 stack testing results. Annual TSP, PM10, and PM2.5 emissions are calculated using a filterable PM factor of 0.68 lb PM/1000 lb coke burned. This value is based on 2017 stack testing data for the ESP operating with 5 fields in service. A 55% safety factor is incorporated into the 2017 stack test result.

HAP/TAP emissions from the FCCU are generated from the FCCU feed, the FCCU catalyst/catalyst additives, and the FCCU regenerator. Organic HAP/TAP emissions from the FCCU regenerator are calculated using emission factors from Table 1 of *Emission of Trace Compounds from Catalytic Cracking Regenerators*, Environmental Progress (October 2002). Metal HAP/TAP emissions from the FCCU feed are calculated using a mass balance approach with the approximate HAP/TAP speciation profile for the feed. Metal HAP/TAP emissions from the FCCU catalyst/catalyst additives are calculated based on the HAP/TAP speciation profiles for the FCCU catalyst/catalyst additives. Total HAP/TAP emissions from the FCCU are calculated as the sum of emissions from the FCCU feed, FCCU catalyst/additives, and FCCU regenerator. The emission factors, emission calculations, and detailed sample calculations, are included in this Section.

STORAGE TANK EMISSIONS (units TK-R and TK-L)

The combined current permitted VOC emission limit in NSR 0633-M14 for units TK-R and TK-L is 100.8 tpy. With the proposed FCCU throughput increase, there will be a future actual increase in products being stored at the facility. To account for an increase in storage tank emissions, a factor of 8.2% (percent increase in FCCU throughput) is added to the permitted 100.8 tpy limit for a proposed revised limit of 109.1 tpy. The storage tanks are the only units being debottlenecked as a part of this project.

GAS COMPRESSOR ENGINE (unit P-C1B)

The current permitted NOx emission limit for unit P-C1B was based on 2009 stack testing data. With this application, Western is proposing to update NO_x emissions with more recent stack testing data. The proposed hourly NO_x limit is calculated by taking the maximum NO_x stack test value from 2015, 2016, and 2017 stack testing data and adding a 50% safety factor.

Emissions for all other pollutants are brought forward from NSR permit 0633-M13,M14-R2.

GAS COMPRESSOR ENGINES (units G-C1A, G-C1B, and G-C1C)

The current permitted NOx emission limits for units G-C1A, G-C1B, and G-C1C were based on 2009 stack testing data. With this application, Western is proposing to update NO_x emissions with more recent stack testing data. The proposed hourly NO_x limit is calculated by taking the average NO_x stack test results from 2016 and 2017 stack testing data. Emissions for all other pollutants are brought forward from NSR permit 0633-M13,M14-R2.

PORTABLE EMISSIONS CONTROL SYSTEM (unit PECS)

Emissions from loading trucks are normally routed to a Vapor Recovery Unit (VRU) to control VOC emissions. Western is permitting a Portable Emission Control System (PECS) that will be used to control vapors from truck loading operations during VRU startup, shutdown, maintenance, and malfunctions. The generator that is being permitted with this permit application, unit GEN-1, will be used to operate the PECS unit.

Emissions from unit PECS are based on 336 hours of annual operation and a maximum hourly loading rate of 2,514 barrels per hour (bbls/hr). Manufacturer guaranteed emission factors for the PECS are used to calculate NO_X, CO, and VOC emissions.

DIESEL-FIRED GENERATOR (unit GEN-1)

Western proposes to permit a portable diesel-fired generator (GEN-1) that will be used throughout the refinery for multiple activities. NO_X, CO, PM, and VOC emissions from the engine are calculated based on manufacturer-provided emission factors. SO_2 emissions are calculated based on the maximum allowable sulfur content (0.0015 wt% sulfur) of the diesel fuel with the assumption that all of the sulfur present will be converted to SO_2 during the combustion process. Hazardous Air Pollutants (HAP) emission factors for the engine are obtained from AP-42, Table 3.3-2, "Gasoline and Diesel Industrial Engines" (10/96). Annual emissions for the engine are based on 8,760 hours per year.

DIESEL FIRED AIR COMPRESSOR ENGINE (unit AC-12)

Western proposes to permit a backup diesel-fired air compressor. NO_x, CO, VOC, TSP, PM_{10}, and $PM_{2.5}$ emissions are calculated based on EPA Tier 3 standards from engine emissions data. SO_2 emissions are calculated based on the maximum allowable sulfur content (0.0015 wt% sulfur) of the diesel fuel with the assumption that all of the sulfur present will be converted to SO_2 during the combustion process. Hazardous Air Pollutants (HAP) emission factors for the engine are obtained from AP-42, Table 3.3-2, "Gasoline And Diesel Industrial Engines" (10/96). Annual emissions for the engine were based on 8,760 hours per year.

NSR Permit 0633-M13/14R3

Addition of two (2) firewater pumps powered by diesel engines. Sulfur oxide emission factors are taken from Table 3.3-1 and HAP emission factors are from Table 3.3-2 in USEPA AAP-42 Section 3.3 “Gasoline and Diesel Industrial Engines” (October 1996). Nitrogen oxide, VOC/hydrocarbon, and particulate emission factors are taken from EPA Tier 4 emission standards. Engines are permitted to 8,760 hours per year at a 9% derate from rate horsepower (755 hp).

Calculations Carried Forward from Current Title V Permit P021-R3

Emissions calculations carried forward from current Title V Permit P021-R3 are also included in this section. Please note that these calculations are reproduced or replicated from previous applications, which can be found in Section 7 in their entirety.

Existing Heater, Boiler , and Turbine Data (excluding those being upgraded)

Source ID	Source Name	Maximum Operating Rate (MMBtu/hr)	Average Operating Rate (MMBtu/hr)	Fuel Heating Value (MMBtu/MMscf)
Z-81-B104	Boilerhouse Unit Boiler (part of cogen unit)	52.00	52.00	910
Z-81-G104	Boilerhouse Unit Gas Turbine (part of cogen unit)	32.00	32.00	910
Z-81-B105	Boilerhouse Unit Boiler (part of cogen unit)	52.00	52.00	910
Z-81-G105	Boilerhouse Unit Gas Turbine (part of cogen unit)	32.00	32.00	910
A-H2	Alkylation Unit Furnace	23.00	23.00	700
C-H1	Crude Unit Furnace	77.00	77.00	700
C-H2	Crude Unit Furnace	30.50	30.50	700
C-H5	Crude Unit Furnace	31.50	31.50	700
D-H1A	DHT Unit Furnace	7.20	7.20	700
D-H2	KHT Unit Furnace	6.90	6.90	700
D-H3	DHT Unit Furnace	9.90	9.90	700
H-F1	NHT Unit Furnace	23.00	23.00	700
H-F2	NHT Unit Furnace	15.00	15.00	700
I-H1	Isomerization Unit Furnace	13.40	13.40	700
I-H2	Isomerization Unit Furnace	7.30	7.30	700
P-H1	Platformer Furnace	49.00	49.00	700
P-H2	Platformer Furnace	33.00	33.00	700

Heater, Boiler, Turbine Emission Factors [1,2]

Emission Source	PM (lb/MMBtu)	NO_X [3] (lb/MMBtu)	CO (lb/MMBtu)	VOC [4] (lb/MMBtu)	Hourly SO_2 (lb/MMBtu)	Annual SO_2 (lb/MMBtu)	H_2S Hourly Limit[2] (gr/dscf)	H_2S Annual Limit (ppmvd)
Existing Heaters - Uncontrolled	7.45E-03	9.80E-02	8.24E-02	5.39E-03	3.84E-02	1.45E-02	0.10	60
Existing Heaters - Uncontrolled (C-H2)	7.45E-03	1.84E-01	8.24E-02	5.39E-03	3.84E-02	1.45E-02	0.10	60
Existing Heaters - Uncontrolled (D-H2)	5.00E-02	3.50E-02	8.24E-02	--	3.84E-02	1.45E-02	0.10	60
Existing Heaters - Uncontrolled (D-H3)	1.02E-02	3.00E-02	4.50E-02	1.20E-02	3.84E-02	1.45E-02	0.10	60
Existing Heaters - Low NOx Burners (C-H1)	7.45E-03	1.50E-01	4.00E-02	5.39E-03	3.84E-02	1.45E-02	0.10	60
Existing Heaters - Low NOx Burners (C-H5 and P-H2)	7.45E-03	9.80E-02	4.00E-02	5.39E-03	3.84E-02	1.45E-02	0.10	60
Existing Heater - Ultra Low NOx Burners (D-H1A)	7.45E-03	3.50E-02	8.24E-02	5.39E-03	3.84E-02	1.45E-02	0.10	60
Existing Cogens - Steam Injection (Z-81-B104/G104 and Z-81-B105/G105)	7.45E-03 / 6.60E-03	--	8.24E-02 / 3.00E-02	5.39E-03 / 2.10E-03	1.57E-02	1.57E-02	0.05	--

[1] Existing heaters (uncontrolled): PM, NO_X, CO, and VOC (lb/MMBtu) emission factors are based on (lb/MMscf) emissions factors of Tables 1.4-1 and 1.4-2 of U.S. EPA AP-42, Section 1.4 (External Combustion Sources), July 1998.

Per AP-42, divide by 1020 BTU/scf to convert Emission Factors from (lb/MMscf) to (lb/MMBtu)

AP-42 PM emission factor more restrictive than 0.05 gr PM/dscf limit of 20.2.37 NMAC

C-H2: NO_X emission factor is based Manufacturer Data.

D-H2: NO_X, VOC, and PM emissions are based upon expected emission rates provided by the manufacturer (Broach Company).

D-H3: NO_X, CO, and VOC emissions are based on guaranteed emission and heat release rates from the manufacturer of burners (Zeeco, Inc.). PM baed on 0.05 gr PM/dscf limit of 20.2.37 NMAC.

C-H1: NO_X emission factor is based on manufacturer's data. CO emission factor is based on (7/93) AP-42 factor and substantiated by attached test data.

C-H5 and P-H2: CO emission factor is based on (7/93) AP-42 factor and substantiated by attached test data.

D-H1A: NO_X emission factor is based on manufacturer's data.

Z-81-B104/G104 and Z-81-B105/G105: NO_X emission factor is based on manufacturer's data. Separate PM, CO, and VOC emission factors given for boiler and turbine parts. SO_2 emission factor is based on 50 gr Total S/Mscf.

[2] SO_2 emission factors based on H_2S limits assuming 100% conversion of H_2S to SO_2. Hourly H2S limit (0.10 gr/dscf) from 40 CFR 60, Subpart J. Annual H2S limit (60 ppmvd) from 01/22/09 Amended Stipulated Order.

[3] NO_X emission factors for Z-81-B104/G104 and Z-81-B105/G105 are based on manufacturer guarantee of emission rate. See the emission rates in Table A.11 and A.12 below.

[4] VOC emission factors for D-H2 are based on manufacturer guarantee of emission rate. See the emission rates in Table A.11 and A.12 below.

Sample Calculation - SO_2 Emission Factors 0.020408163 0.000408163

Hourly Emissions:

$$\frac{0.10\text{ gr}}{\text{dscf}} \left| \frac{\text{lb } H_2S}{7000\text{ gr}} \right| \frac{\text{dscf}}{\text{scf *}} \left| \frac{\text{MMscf}}{700\text{ MMBtu}} \right| \frac{64.06\text{ lb } SO_2}{34.08\text{ lb } H_2S} = \frac{3.84\text{E-02 lb}}{\text{MMBtu}}$$

* Assumption: 0% Water Content

Annual Emissions:

$$\frac{60\text{ ppmvd}}{} \left| \frac{\text{dscf}}{\text{ppmvd * MMdscf}} \right| \frac{\text{MMdscf}}{\text{MMscf *}} \left| \frac{\text{MMscf}}{700\text{ MMBtu}} \right| \frac{\text{lb-mole}}{379.41\text{ dscf}} \left| \frac{64.06\text{ lb } SO_2}{\text{lb-mole}} \right| = \frac{1.45\text{E-02 lb}}{\text{MMBtu}}$$

Conversion factor from lb-mole to standard cubic feet is: 379.41 scf/lb-mol

* Assumption: 0% Water Content

Hourly Emissions for Heaters, Boilers, and Turbines

Source ID	Source Name	PM (lb/hr)	NO_X (lb/hr)	CO (lb/hr)	VOC (lb/hr)	SO_2 (lb/hr)
Z-81-B104	Boilerhouse Unit Boiler (part of cogen unit)	0.39	2.70	4.26	0.28	0.82
Z-81-G104	Boilerhouse Unit Gas Turbine (part of cogen unit)	0.21	7.30	0.96	0.07	0.50
Z-81-B105	Boilerhouse Unit Boiler (part of cogen unit)	0.39	2.70	4.26	0.28	0.82
Z-81-G105	Boilerhouse Unit Gas Turbine (part of cogen unit)	0.21	7.30	0.96	0.07	0.50
A-H2	Alkylation Unit Furnace	0.17	2.25	1.89	0.12	0.88
C-H1	Crude Unit Furnace	0.57	11.55	3.08	0.42	2.95
C-H2	Crude Unit Furnace	0.23	5.61	2.51	0.16	1.17
C-H5	Crude Unit Furnace	0.23	3.09	1.26	0.17	1.21
D-H1A	DHT Unit Furnace	0.05	0.25	0.59	0.04	0.28
D-H2	KHT Unit Furnace	0.35	0.24	0.57	0.33	0.26
D-H3	DHT Unit Furnace	0.10	0.30	0.45	0.12	0.38
H-F1	NHT Unit Furnace	0.17	2.25	1.89	0.12	0.88
H-F2	NHT Unit Furnace	0.11	1.47	1.24	0.08	0.58
I-H1	Isomerization Unit Furnace	0.10	1.31	1.10	0.07	0.51
I-H2	Isomerization Unit Furnace	0.05	0.72	0.60	0.04	0.28
P-H1	Platformer Furnace	0.37	4.80	4.04	0.26	1.88
P-H2	Platformer Furnace	0.25	3.23	1.32	0.18	1.27
Total Emissions		***3.95***	***57.09***	***30.99***	***2.82***	***15.17***

Sample Calculation - Z-81-B104, SO_2

Hourly Emissions:

$$\frac{3.84\text{E-02 lb}}{\text{MMBtu}} \left| \frac{52.00\text{ MMBtu}}{\text{hr}} \right| = \frac{0.82\text{ lb}}{\text{hr}}$$

Annual Emissions for Heaters, Boilers, and Turbines

Source ID	Source Name	PM (tpy)	NO_X (tpy)	CO (tpy)	VOC (tpy)	SO_2 (tpy)
Z-81-B104	Boilerhouse Unit Boiler (part of cogen unit)	1.70	11.83	18.68	1.23	3.58
Z-81-G104	Boilerhouse Unit Gas Turbine (part of cogen unit)	0.93	31.97	4.20	0.29	2.20
Z-81-B105	Boilerhouse Unit Boiler (part of cogen unit)	1.70	11.83	18.68	1.23	3.58
Z-81-G105	Boilerhouse Unit Gas Turbine (part of cogen unit)	0.93	31.97	4.20	0.29	2.20
A-H2	Alkylation Unit Furnace	0.75	9.88	8.30	0.54	1.58
C-H1	Crude Unit Furnace	2.51	50.59	13.49	1.82	5.29
C-H2	Crude Unit Furnace	1.00	24.58	11.00	0.72	2.10
C-H5	Crude Unit Furnace	1.03	13.52	5.52	0.74	2.17
D-H1A	DHT Unit Furnace	0.23	1.10	2.60	0.17	0.14
D-H2	KHT Unit Furnace	1.51	1.06	2.49	1.46	0.50
D-H3	DHT Unit Furnace	0.44	1.30	1.95	0.52	0.47
H-F1	NHT Unit Furnace	0.75	9.88	8.30	0.54	0.68
H-F2	NHT Unit Furnace	0.49	6.44	5.41	0.35	1.58
I-H1	Isomerization Unit Furnace	0.44	5.75	4.83	0.32	1.03
I-H2	Isomerization Unit Furnace	0.24	3.13	2.63	0.17	0.92
P-H1	Platformer Furnace	1.60	21.04	17.67	1.16	0.50
P-H2	Platformer Furnace	1.08	14.16	5.78	0.78	3.37
Total Emissions		***17.32***	***250.04***	***135.74***	***12.35***	***31.88***

Sample Calculation - Z-81-B104, SO_2

Annual Emissions:

$$\frac{1.45\text{E-}02\ \text{lb}}{\text{MMBtu}} \times \frac{52.00\ \text{MMBtu}}{\text{hr}} \times \frac{8{,}760\ \text{hrs}}{\text{yr}} \times \frac{\text{ton}}{2{,}000\ \text{lbs}} = \frac{3.58\ \text{ton}}{\text{yr}}$$

Heater and Boiler Data

Source ID	Source Name	Maximum Operating Rate (MMBtu/hr)	Average Operating Rate (MMBtu/hr)	Fuel Heating Value (MMBtu/MMscf)
Z-81-B102	Boilerhouse Unit Boiler (with Qualifying Control)	65.90	65.90	700
Z-81-B104	Boilerhouse Unit Boiler (part of cogen unit)	52.00	52.00	910
Z-81-G104	Boilerhouse Unit Gas Turbie (part of cogen unit)	32.00	32.00	910
Z-81-B105	Boilerhouse Unit Boiler (part of cogen unit)	52.00	52.00	910
Z-81-G105	Boilerhouse Unit Gas Turbie (part of cogen unit)	32.00	32.00	910
Z-81-B106	Boilerhouse Unit Boiler (with Qualifying Control)	96.70	96.70	700
FB-1 (CO)	FCCU CO Boiler (Combusting CO, with Qualifying Control)	70.00	70.00	700
A-H2	Alkylation Unit Furnace	23.00	23.00	700
C-H1	Crude Unit Furnace	77.00	77.00	700
C-H2	Crude Unit Furnace	30.50	30.50	700
C-H5	Crude Unit Furnace	31.50	31.50	700
D-H1A	DHT Unit Furnace	7.20	7.20	700
D-H2	DHT Unit Furnace	6.90	6.90	700
D-H3	DHT Unit Furnace	9.90	9.90	700
H-F1	NHT Unit Furnace	23.00	23.00	700
H-F2	NHT Unit Furnace	15.00	15.00	700
I-H1	Isomerization Unit Furnace	13.40	13.40	700
I-H2	Isomerization Unit Furnace	7.30	7.30	700
P-H1	Platformer Furnace	49.00	49.00	700
P-H2	Platformer Furnace	33.00	33.00	700

Heater and Boiler HAP Emission Factors [1, 2]

	HAPs Defined in Section 112 (b) of Clean Air Act													TAPs Listed in 20.2.72.502 NMAC				
Emission Source	**Benzene (lb/MMscf)**	**Dichlorobenzene (lb/MMscf)**	**Formaldehyde (lb/MMscf)**	**n-Hexane (lb/MMscf)**	**Naphthalene (lb/MMscf)**	**Toluene (lb/MMscf)**	**Arsenic (lb/MMscf)**	**Cadmium (lb/MMscf)**	**Chromium (lb/MMscf)**	**Lead (lb/MMscf)**	**Manganese (lb/MMscf)**	**Mercury (lb/MMscf)**	**Nickel (lb/MMscf)**	**Barium (lb/MMscf)**	**Copper (lb/MMscf)**	**Molybdenum (lb/MMscf)**	**Vanadium (lb/MMscf)**	**Zinc (lb/MMscf)**
Heaters and Boilers	2.10E-03	1.20E-03	7.50E-02	6.30E-03	6.10E-04	3.40E-03	2.00E-04	1.10E-03	1.40E-03	5.00E-04	3.80E-04	2.60E-04	2.10E-03	4.40E-03	8.50E-04	1.10E-03	2.30E-03	2.90E-02

[1] Except for n-hexane, emission factors for other organic HAPs and metal HAPs are obtained from Tables 1.4-3 and 1.4-4 of U.S. EPA AP-42, Section 1.4 (External Combustion Sources), July 1998.
Emission factors for n-hexane are obtained from Ventura County AB 2588 Combustion Emission Factors, May 2001. The emission factor for the external combustion equipment with lowest heat rating is used as conservative measure.
Emission factors for lead are obtained from Table 1.4-2 of U.S. EPA AP-42, Section 1.4 (External Combustion Sources), July 1998.
[2] Only compounds with emission factors larger than 10^{-4} were included in the analysis. Non-volatile organic compounds and simple asphyxiants were also excluded.

Table A-6. Hourly HAP Emissions from Heaters and Boilers

		HAPs Defined in Section 112 (b) of Clean Air Act													TAPs Listed in 20.2.72.502 NMAC					
Source ID	**Source Name**	**Benzene (lb/hr)**	**Dichlorobenzene (lb/hr)**	**Formaldehyde (lb/hr)**	**n-Hexane (lb/hr)**	**Naphthalene (lb/hr)**	**Toluene (lb/hr)**	**Arsenic (lb/hr)**	**Cadmium (lb/hr)**	**Chromium (lb/hr)**	**Lead (lb/hr)**	**Manganese (lb/hr)**	**Mercury (lb/hr)**	**Nickel (lb/hr)**	**Barium (lb/hr)**	**Copper (lb/hr)**	**Molybdenum (lb/hr)**	**Vanadium (lb/hr)**	**Zinc (lb/hr)**	**Total HAP Emissions (lb/hr)**
Z-81-B102	Boilerhouse Unit Boiler (with Qualifying Control)	1.98E-04	1.13E-04	7.06E-03	5.93E-04	5.74E-05	3.20E-04	1.88E-05	1.04E-04	1.32E-04	4.71E-05	3.58E-05	2.45E-05	1.98E-04	4.14E-04	8.00E-05	1.04E-04	2.17E-04	2.73E-03	***8.90E-03***
Z-81-B104	Boilerhouse Unit Boiler (part of cogen unit)	1.20E-04	6.86E-05	4.29E-03	3.60E-04	3.49E-05	1.94E-04	1.14E-05	6.29E-05	8.00E-05	2.86E-05	2.17E-05	1.49E-05	1.20E-04	2.51E-04	4.86E-05	6.29E-05	1.31E-04	1.66E-03	***5.40E-03***
Z-81-G104	Boilerhouse Unit Gas Turbie (part of cogen unit)	7.38E-05	4.22E-05	2.64E-03	2.22E-04	2.15E-05	1.20E-04	7.03E-06	3.87E-05	4.92E-05	1.76E-05	1.34E-05	9.14E-06	7.38E-05	1.55E-04	2.99E-05	3.87E-05	8.09E-05	1.02E-03	***3.32E-03***
Z-81-B105	Boilerhouse Unit Boiler (part of cogen unit)	1.20E-04	6.86E-05	4.29E-03	3.60E-04	3.49E-05	1.94E-04	1.14E-05	6.29E-05	8.00E-05	2.86E-05	2.17E-05	1.49E-05	1.20E-04	2.51E-04	4.86E-05	6.29E-05	1.31E-04	1.66E-03	***5.40E-03***
Z-81-G105	Boilerhouse Unit Gas Turbie (part of cogen unit)	7.38E-05	4.22E-05	2.64E-03	2.22E-04	2.15E-05	1.20E-04	7.03E-06	3.87E-05	4.92E-05	1.76E-05	1.34E-05	9.14E-06	7.38E-05	1.55E-04	2.99E-05	3.87E-05	8.09E-05	1.02E-03	***3.32E-03***
Z-81-B106	Boilerhouse Unit Boiler (with Qualifying Control)	2.90E-04	1.66E-04	1.04E-02	8.70E-04	8.43E-05	4.70E-04	2.76E-05	1.52E-04	1.93E-04	6.91E-05	5.25E-05	3.59E-05	2.90E-04	6.08E-04	1.17E-04	1.52E-04	3.18E-04	4.01E-03	***1.31E-02***
FB-1 (CO)	FCCU CO Boiler (Combusting CO, with Qualifying Control)	2.10E-04	1.20E-04	7.50E-03	6.30E-04	6.10E-05	3.40E-04	2.00E-05	1.10E-04	1.40E-04	5.00E-05	3.80E-05	2.60E-05	2.10E-04	4.40E-04	8.50E-05	1.10E-04	2.30E-04	2.90E-03	***9.46E-03***
A-H2	Alkylation Unit Furnace	6.90E-05	3.94E-05	2.46E-03	2.07E-04	2.00E-05	1.12E-04	6.57E-06	3.61E-05	4.60E-05	1.64E-05	1.25E-05	8.54E-06	6.90E-05	1.45E-04	2.79E-05	3.61E-05	7.56E-05	9.53E-04	***3.11E-03***
C-H1	Crude Unit Furnace	2.31E-04	1.32E-04	8.25E-03	6.93E-04	6.71E-05	3.74E-04	2.20E-05	1.21E-04	1.54E-04	5.50E-05	4.18E-05	2.86E-05	2.31E-04	4.84E-04	9.35E-05	1.21E-04	2.53E-04	3.19E-03	***1.04E-02***
C-H2	Crude Unit Furnace	9.15E-05	5.23E-05	3.27E-03	2.75E-04	2.66E-05	1.48E-04	8.71E-06	4.79E-05	6.10E-05	2.18E-05	1.66E-05	1.13E-05	9.15E-05	1.92E-04	3.70E-05	4.79E-05	1.00E-04	1.26E-03	***4.12E-03***
C-H5	Crude Unit Furnace	9.45E-05	5.40E-05	3.38E-03	2.84E-04	2.75E-05	1.53E-04	9.00E-06	4.95E-05	6.30E-05	2.25E-05	1.71E-05	1.17E-05	9.45E-05	1.98E-04	3.83E-05	4.95E-05	1.04E-04	1.31E-03	***4.25E-03***
D-H1A	DHT Unit Furnace	2.16E-05	1.23E-05	7.71E-04	6.48E-05	6.27E-06	3.50E-05	2.06E-06	1.13E-05	1.44E-05	5.14E-06	3.91E-06	2.67E-06	2.16E-05	4.53E-05	8.74E-06	1.13E-05	2.37E-05	2.98E-04	***9.73E-04***
D-H2	DHT Unit Furnace	2.07E-05	1.18E-05	7.39E-04	6.21E-05	6.01E-06	3.35E-05	1.97E-06	1.08E-05	1.38E-05	4.93E-06	3.75E-06	2.56E-06	2.07E-05	4.34E-05	8.38E-06	1.08E-05	2.27E-05	2.86E-04	***9.32E-04***
D-H3	DHT Unit Furnace	2.97E-05	1.70E-05	1.06E-03	8.91E-05	8.63E-06	4.81E-05	2.83E-06	1.56E-05	1.98E-05	7.07E-06	5.37E-06	3.68E-06	2.97E-05	6.22E-05	1.20E-05	1.56E-05	3.25E-05	4.10E-04	***1.34E-03***
H-F1	NHT Unit Furnace	6.90E-05	3.94E-05	2.46E-03	2.07E-04	2.00E-05	1.12E-04	6.57E-06	3.61E-05	4.60E-05	1.64E-05	1.25E-05	8.54E-06	6.90E-05	1.45E-04	2.79E-05	3.61E-05	7.56E-05	9.53E-04	***3.11E-03***
H-F2	NHT Unit Furnace	4.50E-05	2.57E-05	1.61E-03	1.35E-04	1.31E-05	7.29E-05	4.29E-06	2.36E-05	3.00E-05	1.07E-05	8.14E-06	5.57E-06	4.50E-05	9.43E-05	1.82E-05	2.36E-05	4.93E-05	6.21E-04	***2.03E-03***
I-H1	Isomerization Unit Furnace	4.02E-05	2.30E-05	1.44E-03	1.21E-04	1.17E-05	6.51E-05	3.83E-06	2.11E-05	2.68E-05	9.57E-06	7.27E-06	4.98E-06	4.02E-05	8.42E-05	1.63E-05	2.11E-05	4.40E-05	5.55E-04	***1.81E-03***
I-H2	Isomerization Unit Furnace	2.19E-05	1.25E-05	7.82E-04	6.57E-05	6.36E-06	3.55E-05	2.09E-06	1.15E-05	1.46E-05	5.21E-06	3.96E-06	2.71E-06	2.19E-05	4.59E-05	8.86E-06	1.15E-05	2.40E-05	3.02E-04	***9.86E-04***
P-H1	Platformer Furnace	1.47E-04	8.40E-05	5.25E-03	4.41E-04	4.27E-05	2.38E-04	1.40E-05	7.70E-05	9.80E-05	3.50E-05	2.66E-05	1.82E-05	1.47E-04	3.08E-04	5.95E-05	7.70E-05	1.61E-04	2.03E-03	***6.62E-03***
P-H2	Platformer Furnace	9.90E-05	5.66E-05	3.54E-03	2.97E-04	2.88E-05	1.60E-04	9.43E-06	5.19E-05	6.60E-05	2.36E-05	1.79E-05	1.23E-05	9.90E-05	2.07E-04	4.01E-05	5.19E-05	1.08E-04	1.37E-03	***4.46E-03***
Total HAP Emissions		***2.07E-03***	***1.18E-03***	***7.38E-02***	***6.20E-03***	***6.00E-04***	***3.34E-03***	***1.97E-04***	***1.08E-03***	***1.38E-03***	***4.92E-04***	***3.74E-04***	***2.56E-04***	***2.07E-03***	***4.33E-03***	***8.36E-04***	***1.08E-03***	***2.26E-03***	***2.85E-02***	***0.09***

Sample Calculation - Z-81-B102, Benzene

Hourly Emissions: (Emission Factor) x (Maximum Operating Rate/Fuel Heating Value)

Hourly Emissions:

$$\frac{2.10\text{E-03 lb}}{\text{MMscf}} \left| \frac{65.9\text{ MMBtu}}{\text{hr}} \right| \frac{\text{MMscf}}{700\text{ MMBtu}} = \frac{1.98\text{E-04 lb}}{\text{hr}}$$

Annual HAP Emissions from Heaters and Boilers

Source ID	Source Name	HAPs Defined in Section 112 (b) of Clean Air Act													Total HAP
		Benzene (tpy)	Dichlorobenzene (tpy)	Formaldehyde (tpy)	n-Hexane (tpy)	Naphthalene (tpy)	Toluene (tpy)	Arsenic (tpy)	Cadmium (tpy)	Chromium (tpy)	Lead (tpy)	Manganese (tpy)	Mercury (tpy)	Nickel (tpy)	Emissions (tpy)
Z-81-B102	Boilerhouse Unit Boiler (with Qualifying Control)	8.66E-04	4.95E-04	3.09E-02	2.60E-03	2.52E-04	1.40E-03	8.25E-05	4.54E-04	5.77E-04	2.06E-04	1.57E-04	1.07E-04	8.66E-04	***3.90E-02***
Z-81-B104	Boilerhouse Unit Boiler (part of cogen unit)	5.26E-04	3.00E-04	1.88E-02	1.58E-03	1.53E-04	8.51E-04	5.01E-05	2.75E-04	3.50E-04	1.25E-04	9.51E-05	6.51E-05	5.26E-04	***2.37E-02***
Z-81-G104	Boilerhouse Unit Gas Turbie (part of cogen unit)	3.23E-04	1.85E-04	1.16E-02	9.70E-04	9.40E-05	5.24E-04	3.08E-05	1.69E-04	2.16E-04	7.70E-05	5.85E-05	4.00E-05	3.23E-04	***1.46E-02***
Z-81-B105	Boilerhouse Unit Boiler (part of cogen unit)	5.26E-04	3.00E-04	1.88E-02	1.58E-03	1.53E-04	8.51E-04	5.01E-05	2.75E-04	3.50E-04	1.25E-04	9.51E-05	6.51E-05	5.26E-04	***2.37E-02***
Z-81-G105	Boilerhouse Unit Gas Turbie (part of cogen unit)	3.23E-04	1.85E-04	1.16E-02	9.70E-04	9.40E-05	5.24E-04	3.08E-05	1.69E-04	2.16E-04	7.70E-05	5.85E-05	4.00E-05	3.23E-04	***1.46E-02***
Z-81-B106	Boilerhouse Unit Boiler (with Qualifying Control)	1.27E-03	7.26E-04	4.54E-02	3.81E-03	3.69E-04	2.06E-03	1.21E-04	6.66E-04	8.47E-04	3.03E-04	2.30E-04	1.57E-04	1.27E-03	***5.72E-02***
FB-1 (CO)	FCCU CO Boiler (Combusting CO, with Qualifying Control)	9.20E-04	5.26E-04	3.29E-02	2.76E-03	2.67E-04	1.49E-03	8.76E-05	4.82E-04	6.13E-04	2.19E-04	1.66E-04	1.14E-04	9.20E-04	***4.14E-02***
A-H2	Alkylation Unit Furnace	3.02E-04	1.73E-04	1.08E-02	9.07E-04	8.78E-05	4.89E-04	2.88E-05	1.58E-04	2.01E-04	7.20E-05	5.47E-05	3.74E-05	3.02E-04	***1.36E-02***
C-H1	Crude Unit Furnace	1.01E-03	5.78E-04	3.61E-02	3.04E-03	2.94E-04	1.64E-03	9.64E-05	5.30E-04	6.75E-04	2.41E-04	1.83E-04	1.25E-04	1.01E-03	***4.56E-02***
C-H2	Crude Unit Furnace	4.01E-04	2.29E-04	1.43E-02	1.20E-03	1.16E-04	6.49E-04	3.82E-05	2.10E-04	2.67E-04	9.54E-05	7.25E-05	4.96E-05	4.01E-04	***1.80E-02***
C-H5	Crude Unit Furnace	4.14E-04	2.37E-04	1.48E-02	1.24E-03	1.20E-04	6.70E-04	3.94E-05	2.17E-04	2.76E-04	9.86E-05	7.49E-05	5.12E-05	4.14E-04	***1.86E-02***
D-H1A	DHT Unit Furnace	9.46E-05	5.41E-05	3.38E-03	2.84E-04	2.75E-05	1.53E-04	9.01E-06	4.96E-05	6.31E-05	2.25E-05	1.71E-05	1.17E-05	9.46E-05	***4.26E-03***
D-H2	DHT Unit Furnace	9.07E-05	5.18E-05	3.24E-03	2.72E-04	2.63E-05	1.47E-04	8.63E-06	4.75E-05	6.04E-05	2.16E-05	1.64E-05	1.12E-05	9.07E-05	***4.08E-03***
D-H3	DHT Unit Furnace	1.30E-04	7.43E-05	4.65E-03	3.90E-04	3.78E-05	2.11E-04	1.24E-05	6.81E-05	8.67E-05	3.10E-05	2.35E-05	1.61E-05	1.30E-04	***5.86E-03***
H-F1	NHT Unit Furnace	3.02E-04	1.73E-04	1.08E-02	9.07E-04	8.78E-05	4.89E-04	2.88E-05	1.58E-04	2.01E-04	7.20E-05	5.47E-05	3.74E-05	3.02E-04	***1.36E-02***
H-F2	NHT Unit Furnace	1.97E-04	1.13E-04	7.04E-03	5.91E-04	5.73E-05	3.19E-04	1.88E-05	1.03E-04	1.31E-04	4.69E-05	3.57E-05	2.44E-05	1.97E-04	***8.87E-03***
I-H1	Isomerization Unit Furnace	1.76E-04	1.01E-04	6.29E-03	5.28E-04	5.11E-05	2.85E-04	1.68E-05	9.22E-05	1.17E-04	4.19E-05	3.19E-05	2.18E-05	1.76E-04	***7.93E-03***
I-H2	Isomerization Unit Furnace	9.59E-05	5.48E-05	3.43E-03	2.88E-04	2.79E-05	1.55E-04	9.14E-06	5.02E-05	6.39E-05	2.28E-05	1.74E-05	1.19E-05	9.59E-05	***4.32E-03***
P-H1	Platformer Furnace	6.44E-04	3.68E-04	2.30E-02	1.93E-03	1.87E-04	1.04E-03	6.13E-05	3.37E-04	4.29E-04	1.53E-04	1.17E-04	7.97E-05	6.44E-04	***2.90E-02***
P-H2	Platformer Furnace	4.34E-04	2.48E-04	1.55E-02	1.30E-03	1.26E-04	7.02E-04	4.13E-05	2.27E-04	2.89E-04	1.03E-04	7.85E-05	5.37E-05	4.34E-04	***1.95E-02***
Total HAP Emissions		***9.05E-03***	***5.17E-03***	***3.23E-01***	***2.71E-02***	***2.63E-03***	***1.46E-02***	***8.62E-04***	***4.74E-03***	***6.03E-03***	***2.15E-03***	***1.64E-03***	***1.12E-03***	***9.05E-03***	***0.41***

Sample Calculation - Z-81-B102, Benzene

Annual Emissions: (Emission Factor) x (Average Operating Rate/Fuel Heating Value) x (8760 hrs/yr) x (ton/2000 lbs)

Annual Emissions: $\frac{2.10\text{E-}03 \text{ lb}}{\text{MMscf}} \left| \frac{65.9 \text{ MMBtu}}{\text{hr}} \right| \frac{\text{MMscf}}{700 \text{ MMBtu}} \left| \frac{8{,}760 \text{ hrs}}{\text{yr}} \right| \frac{\text{ton}}{2{,}000 \text{ lbs}} = \frac{8.66\text{E-}04 \text{ ton}}{\text{yr}}$

Boiler Upgrade Data

Source ID	Source Name	Maximum Operating Rate (MMBtu/hr)	Average Operating Rate (MMBtu/hr)	Fuel Heating Value (MMBtu/MMscf)
Z-81-B102	Boilerhouse Unit Boiler (with Qualifying NOx Control)	65.9	65.9	700
Z-81-B106	Boilerhouse Unit Boiler (with Qualifying NOx Control)	96.7	96.7	700
FB-1	FCCU CO Boiler (with Qualifying NOx Control)		See FCCU NOx calculations	

[a] Maximum operating rate is based on *NSR Permit 0633-M7-R4* for exisiting units and *expected design* for upgraded units.
[b] Fuel gas heating value is from *2007 NSR Application*.
[c] It is assumed that average operating rate is the same as the maximum operating rate.

Boiler Emission Factors [1,2]

Emission Source	PM (lb/MMBtu)	NO_X (lb/MMBtu)	CO (lb/MMBtu)	VOC (lb/MMBtu)	Hourly SO_2 (lb/MMBtu)	Annual SO_2 (lb/MMBtu)	H_2S Hourly Limit (gr/dscf)	H_2S Annual Limit (ppmvd)
Z-81-B102, Z-81-B106 - Qualifying NO_X Control, Annual H_2S limit, AP-42	7.45E-03	0.040	8.24E-02	5.39E-03	3.84E-02	1.45E-02	0.10	60
FB-1				See FCCU calculations				

[1]Z-81-B102, Z-81-B106: NOx emission factor from 01/22/09 Amended Order "Qualifying Control" definition (0.040 lb/MMBtu)
Z-81-B102, Z-81-B106: PM, CO, and VOC (lb/MMBtu) emission factors are based on (lb/MMscf) emissions factors of Tables 1.4-1 and 1.4-2 of U.S. EPA AP-42, Section 1.4 (External Combustion Sources), July 1998.
Per AP-42, divide by 1020 BTU/scf to convert emission factors from (lb/MMscf) to (lb/MMBtu)
AP-42 PM emission factor more restrictive than 0.05 gr PM/dscf limit of 20.2.37 NMAC
[2] Z-81-B102, Z-81-B106: SO_2 emission factors based on H_2S limits assuming 100% conversion of H_2S to SO_2. Hourly H_2S limit (0.10 gr/dscf) from 40 CFR 60, Subpart J. Annual H2S limit (60 ppmvd) from 01/22/09 Amended Stipulated Order.

Sample Calculation - SO_2 Emission Factors

Hourly Emissions:

$$\frac{0.10\text{ gr}}{\text{dscf}} \times \frac{\text{lb } H_2S}{7000\text{ gr}} \times \frac{\text{dscf}}{\text{scf *}} \times \frac{\text{MMscf}}{700\text{ MMBtu}} \times \frac{64.06\text{ lb } SO_2}{34.08\text{ lb } H_2S} = \frac{3.84\text{E-02 lb}}{\text{MMBtu}}$$

* Assumption: 0% Water Content

Annual Emissions:

$$60\text{ ppmvd} \times \frac{\text{dscf}}{\text{ppmvd * MMdscf}} \times \frac{\text{MMdscf}}{\text{MMscf *}} \times \frac{\text{MMscf}}{700\text{ MMBtu}} \times \frac{\text{lb-mole}}{379.41\text{ dscf}} \times \frac{64.06\text{ lb } SO_2}{\text{lb-mole}} = \frac{1.45\text{E-02 lb}}{\text{MMBtu}}$$

Conversion factor from lb-mole to standard cubic feet is: 379.41 scf/lb-mol
* Assumption: 0% Water Content

Table A.9. Hourly Emissions for Upgraded Boilers

Source ID	Source Name	PM (lb/hr)	NO_X (lb/hr)	CO (lb/hr)	VOC (lb/hr)	SO_2 (lb/hr)
Z-81-B102	Boilerhouse Unit Boiler (with Qualifying NOx Control)	0.49	2.64	5.43	0.36	2.53
Z-81-B106	Boilerhouse Unit Boiler (with Qualifying NOx Control)	0.72	3.87	7.96	0.52	3.71
F-B1	FCCU CO Boiler (with Qualifying NOx Control)			See FCCU calculations		
Upgraded Units Total Emissions		***1.21***	***6.50***	***13.39***	***0.88***	***6.24***

Sample Calculation - Z-81-B102, NOx

Hourly Emissions:

$$\frac{4.00\text{E-02 lb}}{\text{MMBtu}} \times \frac{65.90\text{ MMBtu}}{\text{hr}} = \frac{2.64\text{ lb}}{\text{hr}}$$

Table A.10. Annual Emissions for Upgraded Boilers

Source ID	Source Name	PM (tpy)	NO_X (tpy)	CO (tpy)	VOC (tpy)	SO_2 (tpy)
Z-81-B102	Boilerhouse Unit Boiler (with Qualifying NOx Control)	2.15	11.55	23.77	1.56	0.95
Z-81-B106	Boilerhouse Unit Boiler (with Qualifying NOx Control)	3.16	16.94	34.88	2.28	1.40
F-B1	FCCU CO Boiler (with Qualifying NOx Control)			See FCCU calculations		
Upgraded Units Total Emissions		***5.31***	***28.49***	***58.65***	***3.84***	***2.35***

Sample Calculation - Z-81-B102, NOx

Annual Emissions:

$$\frac{4.00\text{E-02 lb}}{\text{MMBtu}} \times \frac{65.90\text{ MMBtu}}{\text{hr}} \times \frac{8{,}760\text{ hrs}}{\text{yr}} \times \frac{\text{ton}}{2{,}000\text{ lbs}} = \frac{11.55\text{ ton}}{\text{yr}}$$

Gas Compressor Engines Specifications [1]

Source ID	Nominal Output (hp)	BSFC[1] (Btu/hp-hr)	Fuel Heating Value (MMBtu/MMscf)	Heat Input (MMBtu/hr)
G-C1A	330	9,000	700	2.97
G-C1B	330	9,000	700	2.97
G-C1C	330	9,000	700	2.97
P-C1A	450	9,000	700	4.05
P-C1B	450	9,000	700	4.05

[a] Maximum operating rate is based on *NSR Permit 0633-M7-R4* for exisiting units.

[b] Fuel gas heating value is from *2007 NSR Application*.

[c] It is assumed that average operating rate is the same as the maximum operating rate.

[1] Brake Specific Fuel Consumption (BSFC) is based on best engineering judgment and knowledge of the facility.

Gas Compressor Engines Emission Factors

P-C1B		
2015 Stack Test Results Average NO_x	5.77	lb/hr
2016 Stack Test Results Average NOx	2.72	lb/hr
2017 Stack Test Results Average NOx	4.19	lb/hr
NO_x Emission Factor[1]	8.655	lb/hr

[1] The proposed emission factor was based on taking a maximum of the 2015, 2016, and 2017 stack testing results for P-C1B and adding a 50% safety factor.

	G-C1A	G-C1B	G-C1C	
2016 Stack Test Results Average NOx	15.07	13.32	15.12	lb/hr
2017 Stack Test Results Average NOx	7.93	8.84	10.48	lb/hr
NOx Emission Factor[1]	11.5	11.08	12.8	lb/hr

[1] The proposed emission rate was based on taking an average of the 2016 and 2017 stack testing results

Emission Source	PM (lb/MMBtu)	CO (lb/hr)	VOC (lbMMBtu)	SO_2 (lb/MMBtu)	H_2S Limit (gr/dscf)
Gas Con Unit Engines	9.99E-03	8.5	1.18E-01	3.84E-02	0.10
Platformer Unit Gas Engines	9.99E-03	8.5	1.18E-01	3.84E-02	0.10

[1] NO_X and CO emission factors based on March, August, and September 2009 testing of the compressor engines.

[2] PM and VOC emission factor from Table 3.2-2 of U.S. EPA AP-42, Section 3.2 (Natural Gas-fired Reciprocating Engines), July 2000.

AP-42 PM emission factor approximates 0.05 gr PM/dscf limit of 20.2.37 NMAC

[3] SO_2 emission factors based on H_2S limits assuming 100% conversion of H_2S to SO_2. Fuel Gas H2S limit (0.10 gr/dscf) from 40 CFR 60, Subpart J.

Sample Calculation - SO_2 Emission Factors

Hourly Emissions: $\frac{0.10\ gr}{dscf} \left| \frac{lb\ H_2S}{7000\ gr} \right| \frac{dscf}{scf\ *} \left| \frac{MMscf}{700\ MMBtu} \right| \frac{64.06\ lb\ SO_2}{34.08\ lb\ H_2S} = \frac{0.0\ lb}{MMBtu}$

* Assumption: 0% Water Content

Hourly Emissions for Gas Compressor Engines

Source ID	Source Name	PM (lb/hr)	NO_X (lb/hr)	CO (lb/hr)	VOC (lb/hr)	SO_2 (lb/hr)
G-C1A	Gas Con Unit Gas Compressor Engine	0.030	11.50	8.50	0.35	0.11
G-C1B	Gas Con Unit Gas Compressor Engine	0.030	11.08	8.50	0.35	0.11
G-C1C	Gas Con Unit Gas Compressor Engine	0.030	12.80	8.50	0.35	0.11
P-C1B	Platformer Unit Gas Compressor Engine	0.040	8.66	8.50	0.48	0.16
Total Emissions		***0.13***	***44.04***	***34.00***	***1.53***	***0.50***

Sample Calculation - G-C1A, SO_2

Hourly Emissions: $\frac{3.84E\text{-}02\ lb}{MMBtu} \left| \frac{2.97\ MMBtu}{hr} \right. = \frac{0.11\ lb}{hr}$

Annual Emissions for Gas Compressor Engines

Source ID	Source Name	PM (tpy)	NO_X (tpy)	CO (tpy)	VOC (tpy)	SO_2 (tpy)
G-C1A	Gas Con Unit Gas Compressor Engine	0.13	50.37	37.23	1.54	0.50
G-C1B	Gas Con Unit Gas Compressor Engine	0.13	48.53	37.23	1.54	0.50
G-C1C	Gas Con Unit Gas Compressor Engine	0.13	56.06	37.23	1.54	0.50
P-C1B	Platformer Unit Gas Compressor Engine	0.18	37.91	37.23	2.09	0.68
Total Emissions		***0.57***	***192.87***	***148.92***	***6.70***	***2.18***

Sample Calculation - G-C1A, SO_2

Annual Emissions: $\frac{3.84E\text{-}02\ lb}{MMBtu} \left| \frac{2.97\ MMBtu}{hr} \right| \frac{8{,}760\ hrs}{yr} \left| \frac{ton}{2{,}000\ lbs} \right. = \frac{0.50\ ton}{yr}$

Emission Source: Unit FL-1
Decription: Process Flare

Flaring Operations		Units
Annual Total Fuel Usage[1]	697,054	kscf/yr
Maximum Hourly Flare Gas Flow[2]	350	kscf/hr
Maximum Lower Heating Value[3]	1,364	Btu/scf
Average Lower Heating Value[4]	956	Btu/scf
Annual Flare Firing Rate	666,072	MMBtu/yr
Maximum Flare Firing Rate	477.3	MMBtu/hr

[1] Per 2014 PI data for the flare's flow rates. A 15% safety factor was applied to the 2014 total fuel usage.

[2] Maximum hourly gas flow established per analysis of Gallup's 2014 PI data for the flare.

[3] This value was obtained by taking the maximum lower heating value of the flare gas during the months of April to December 2014 from the refinery's PI data. The heating values for each month were calculated using the contributions from the different flare gas components and their individual heating values.

[4] This value was obtained by taking the average lower heating value of the flare gas during the months of April to December 2014 from the refinery's PI data. The heating values for each month were calculated using the contributions from the different flare gas components and their individual heating values.

Uncontrolled Emissions

NOx[1]	CO	VOC[2]	H_2S[3]	SOx[3]	TSP[4]	PM_{10}[4]	$PM_{2.5}$[4]	Total HAPs	Units	Notes
0.0884	0.31	0.4275			-	-	-		lb/MMBtu	Table 6-2, Section 6, Emissions Estimation Protocol for Petroleum
			0.10						gr/dscf	NSPS Ja limit, 230 mg/dscm, 0.10 gr/dscf
42.2	148.0	204.0	0.10	9.4	-	-	-	5.9	lb/hr	Proposed Limits
29.4	103.2	142.4	0.10	9.4	-	-	-	4.1	tpy	
11.2	81.1	235.9	-	2.1	-	-	-	0.49	lb/hr	Permitted Limits
7.6	40.6	108.6	-	3.7	-	-	-	2.2	tpy	

[1] 30% increase of the AP-42 emission factor to take into account the increase in NOx emissions as a result of the higher H_2 content of flare gas. This NO_x factor was obtained from Figure 3 in the National Petroleum Refiners Association publication "NOx Emissions from Process Heaters and Boilers: Improving Emissions Estimates (1995)."

[2] Applied a factor of 75% to the VOC emission factor (Table 6-2, Section 6, Emissions Estimation Protocol for Petroleum Refineries) since only 75% of the total LHV contribution comes from VOC components.

[3] 98% combustion H_2S and 100% conversion to SO_2

[4] This flare is a smokeless flare; hence, there will be no TSP, PM_{10}, and $PM_{2.5}$ emissions released from this unit.

HAP emissions			
	Wt%[1]	lb/hr	tpy
Benzene	0.32%	0.65	0.46
n-Hexane	2.23%	4.6	3.2
Toluene	0.27%	0.55	0.38
Xylene	0.06%	0.12	0.085
Total HAPs		5.9	4.1

[1] HAP Wt% from TANKS 4.0.9d speciation for Crude Oil (Four Corners Sweet)

Stack Parameters

Stack Height	100.0	ft	Design Specification
Stack Temperature	1832	°F	Per NMAQB guidelines
Exhaust Velocity	20	m/s	Per NMAQB guidelines
Exhaust Flowrate	39,179	acfm	Design Specification
	653.0	acfs	
Stack Diameter	3.6	ft	Design Specification

Process Flare - GHG Emission Calculation

44/12	Ratio of Molecular Weights, CO2 to C	3.67	(unitless)	Provided in Equation Y-1 (Rule)
0.001	Conversion factor from kg to metric tons	0.001	metric tons/kg	Provided in Equation Y-1 (Rule)
0.98	Assumed combustion efficiency of a flare	0.98	$lb_{combusted}/lb_{flared}$	Provided in Equation Y-1 (Rule)
EmF	Default Emission Factor for CO2	60	kg/mmbtu	Provided in Equation Y-4 and Y-5 (Rule)
EmF_{CH4}	Default CH4 Emission Factor for Petr. Prods	3.0E-03	kg/mmbtu	Provided in Table C-2 (Rule)
0.02/0.98	Correction factor for flare combustion	0.02	$lb_{slip}/lb_{combusted}$	Provided in Equation Y-4 (Rule)
16/44	Correction factor for MWs of CH4 to CO2	0.36	(unitless)	Provided in Equation Y-4 (Rule)
f_{CH4}	Weight fraction C in the flare prior to combustion	0.4	kgC_{CH4}/kgC_{flare}	Provided in Equation Y-4 (Rule)
EmF_{N2O}	Default N2O emission factor for Petr. Prods	6.0E-04	kg/mmbtu	Provided in Table C-2 (Rule)
MW_C	Molecular weight of carbon (elemental)	12.011	kg/kg-mol	ASTM Standard Designation D 3588-98 (Reapproved 2003)
GWP_{CH4}	Methane Global Warming Potential	25	mtons CO2e/mtons	Provided in Table A-1 (Rule)
GWP_{N2O}	Nitrous Oxide Global Warming Potential	298	mtons CO2e/mtons	Provided in Table A-1 (Rule)
$Flare_{Norm}$	Volume of flare gas combusted during normal operation	697,054,025	scf/year	Per 2014 PI data for the flare's flow rates. A 15% safety factor was applied to the 2014 total fuel usage.
HHV	Higher heating value for fuel gas or flare gas	1,054	Btu/scf	This value was obtained by taking the average higher heating value of the flare gas during the months of April to December 2014 from the refinery's PI data. The heating values for each month were calculated using the contributions from the different flare gas components and their individual heating values.

CO_2	Total Annual CO_2 from Flaring	47,637.5	tons CO_2	Equation Y-3, 40 CFR 98.253 (b) (1) (iii) (C)
CH_4	Total Annual CH_4 from Flaring	143.8	tons CH_4	Equation Y-4, 40 CFR 98.253 (b) (2)
N_2O	Total Annual N_2O from Flaring	0.48	tons N_2O	Equation Y-5, 40 CFR 98.253 (b) (3)
CO_2e	Total Annual CO_2e Emissions	51,374.2	tons CO_2e	Equation A-1, 40 CFR 98.2 (b) (4)

Sample Number: 296886
Product: FLARE_MAIN

Sample Report

Analysis ID	Component Name	Units	Result	Result	Result	Result	Result	Result	Result
			3/13/2014	5/22/2014	7/25/2014	8/21/2014	9/23/2014	10/20/2014	12/19/2014
GCMOLE_TH2/1	Hydrogen	mole%	41.065	72.815	61.123	26.421	54.521	55.423	64.225
GCMOLE_TH2/1	C6+ Composite	mole%	0.001	0.001	0.001	0.002	0.002	0.001	0.001
GCMOLE_TH2/1	Propane	mole%	32.279	8.473	10.914	39.231	5.122	6.532	4.075
GCMOLE_TH2/1	Acetylene	mole%	0.000	0.000	0.000	0.000	0.000	0.000	0.000
GCMOLE_TH2/1	Propylene	mole%	0.104	0.231	0.732	1.102	0.388	0.315	0.175
GCMOLE_TH2/1	Isobutane	mole%	2.722	1.908	3.298	6.095	5.766	3.578	2.328
GCMOLE_TH2/1	Propadiene	mole%	0.000	0.000	0.000	0.000	0.000	0.000	0.000
GCMOLE_TH2/1	N-Butane	mole%	3.589	1.735	1.401	2.356	2.603	1.240	1.162
GCMOLE_TH2/1	1-Butene	mole%	0.016	0.019	0.036	0.080	0.037	0.040	0.018
GCMOLE_TH2/1	Isobutylene	mole%	0.000	0.031	0.061	0.139	0.073	0.060	0.034
GCMOLE_TH2/1	Trans-2-Butene	mole%	0.000	0.000	0.038	0.087	0.041	0.000	0.022
GCMOLE_TH2/1	Cis-2-Butene	mole%	0.000	0.012	0.025	0.063	0.030	0.000	0.015
GCMOLE_TH2/1	1,3-Butadiene	mole%	0.000	0.428	0.000	0.000	0.000	0.000	0.000
GCMOLE_TH2/1	Isopentane	mole%	0.257	0.033	0.563	0.506	1.520	0.447	0.574
GCMOLE_TH2/1	N-Pentane	mole%	0.121	0.414	0.411	0.308	1.270	0.242	0.445
GCMOLE_TH2/1	Carbon Dioxide	mole%	0.218	0.172	0.140	0.538	0.337	0.249	0.182
GCMOLE_TH2/1	Ethylene	mole%	0.053	0.078	0.210	0.427	0.231	0.276	0.287
GCMOLE_TH2/1	Ethane	mole%	4.190	2.820	4.425	3.527	5.115	5.200	5.343
GCMOLE_TH2/1	Oxygen/Argon	mole%	0.261	0.178	0.180	0.195	0.092	0.040	0.188
GCMOLE_TH2/1	Nitrogen	mole%	2.102	1.527	1.694	1.807	2.105	2.546	1.855
GCMOLE_TH2/1	Hydrogen Sulfide	mole%	0.000	0.000	0.000	0.000	0.000	0.000	0.000
GCMOLE_TH2/1	Methane	mole%	11.645	8.114	13.099	15.404	18.478	21.488	17.171
GCMOLE_TH2/1	Carbon Monoxide	mole%	1.348	0.936	1.500	1.605	1.925	2.254	1.803
GCMOLE_TH2/1	Totai_Mole_Percent	mole%	100	100	99.9	99.9	99.7	99.9	99.9
GCMOLE_TH2/1	Specific_Gravity		0.80391	0.37495	0.49304	0.99931	0.56548	0.48413	0.39510
GCMOLE_TH2/1	Net_Heat_of_Combustion	Btu/ft3	1261.0	670.6	824.8	1523.6	903.8	776.0	678.6
GCMOLE_TH2/1	Gross_Heat_of_Combustion	Btu/ft3	1383.4	749.3	914.7	1664.7	999.3	861.8	757.9
GCMOLE_TH2/1	C1_total	mole%	11.6450000000	8.1140000000	13.0990000000	15.4040000000	18.4780000000	21.4880000000	17.1710000000
GCMOLE_TH2/1	C2_total	mole%	4.2430000000	2.8980000000	4.6350000000	3.9540000000	5.3460000000	5.4760000000	5.6300000000
GCMOLE_TH2/1	C3_total	mole%	32.3830000000	8.7040000000	11.6460000000	40.3330000000	5.5100000000	6.8470000000	4.2500000000
GCMOLE_TH2/1	C4_total	mole%	6.3270000000	4.1330000000	4.8590000000	8.8200000000	8.5500000000	4.9180000000	3.5790000000
GCMOLE_TH2/1	C5_total	mole%	0.3780000000	0.4470000000	0.9740000000	0.8140000000	2.7900000000	0.6890000000	1.0190000000
GCMOLE_TH2/1	C6_total	mole%	0.0010000000	0.0010000000	0.0010000000	0.0020000000	0.0020000000	0.0010000000	0.0010000000
GCMOLE_TH2/1	Paraffins	mole%	51.8240000000	21.5560000000	30.2500000000	60.8260000000	32.5880000000	34.7020000000	28.1960000000
GCMOLE_TH2/1	IsoParaffins	mole%	2.9790000000	1.9410000000	3.8610000000	6.6010000000	7.2860000000	4.0250000000	2.9020000000
GCMOLE_TH2/1	Olefins	mole%	0.1730000000	0.7990000000	1.1020000000	1.8980000000	0.8000000000	0.6910000000	0.5510000000
SULF_5453/1	Sulfur_ppm	ppm	16.5						

Emission Source: SM-1 & SM-2
Decription: Electrically-Driven Evaporation Pond Spraying Snow Machine

The following calculation uses the emission factors derived in the "PM Emission Factor Determination from Wastewater Evaporation Systems, April 2014" white paper submitted to the NMED for the mechanical evaporator located at Western's Gallup Refinery. The emission factors for $PM_{2.5}$ and PM_{10} at a fixed TDS concentration established in this study will be used to calculate emission factors for varying TDS concentrations in order to provide a worst-case estimate due to fluctuations in the evaporation pond TDS concentration.

Calculation Constants:

The information in the table below is used in the calculations.

Description		Value	Units
Emission Factors[1]	PM_{10}:	0.127	lb $PM_{10}/10^3$ gal
	$PM_{2.5}$:	0.109	lb $PM_{2.5}/10^3$ gal
Mechanical Evaporator Flow Rate:		80	gal/min
$TDS_{Reference}$:		12,000	ppmw

[1] based on "PM Emission Factor Determination from Wastewater Evaporation Systems, April 2014"

TDS Concentration Method:

Equation 1. is used to scale the emission factor based on the TDS concentration of interest and a TDS reference concentration (12,000 ppmw) used in the initial "PM Emission Factor Determination from Wastewater Evaporation Systems, April 2014" study.

$$Emission\ Factor\left({}^{lb\ PM_x}/_{10^3 gal}\right) = \frac{TDS_{Concentration}(ppmw)}{TDS_{Reference}(ppmw)} \times Emission\ Factor_{Reference}\left({}^{lb\ PM_x}/_{10^3 gal}\right)$$ Equation 1.

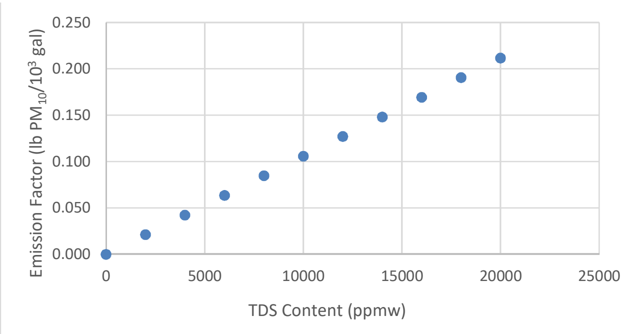
Equation 1.

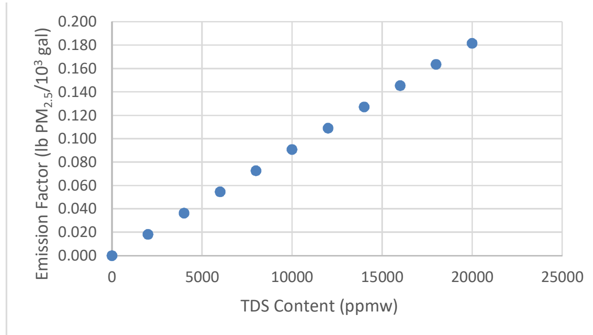
Equations 2 and 3 are then used to calculate the $PM_{2.5}$ and PM_{10} emission rates based on the total wastewater flow through the mechanical evaporator. The results are seen in the Table below.

$$Emission\ Rate\left({}^{lb}/_{hr}\right) = \frac{Emission\ Factor\left({}^{lb\ PM_x}/_{10^3 gal}\right) \times Flow\ Rate(gal/min) \times 60\left({}^{min}/_{hr}\right)}{1000\ (gal)}$$ Equation 2.

$$Emission\ Rate(TPY) = \frac{Emission\ Rate\left({}^{lb}/_{hr}\right) \times 8{,}760\left({}^{hr}/_{yr}\right)}{2{,}000\left({}^{lb}/_{ton}\right)}$$ Equation 3.

TDS Concentration (ppmw)	Emission Factor (lb $PM_x/10^3$ gal)		Emission Rates			
			PM_{10}		$PM_{2.5}$	
	PM_{10}	$PM_{2.5}$	lb/hr	TPY	lb/hr	TPY
0	0.000	0.000	0.00	0.00	0.00	0.00
2,000	0.021	0.018	0.10	0.45	0.09	0.38
4,000	0.042	0.036	0.20	0.89	0.17	0.76
6,000	0.064	0.055	0.30	1.34	0.26	1.15
8,000	0.085	0.073	0.41	1.78	0.35	1.53
10,000	0.106	0.091	0.51	2.23	0.44	1.91
12,000	0.127	0.109	0.61	2.67	0.52	2.29
14,000	0.148	0.127	0.71	3.12	0.61	2.67
16,000	0.169	0.145	0.81	3.56	0.70	3.06
18,000	0.191	0.164	0.91	4.01	0.78	3.44
20,000	0.212	0.182	1.02	4.45	0.87	3.82





User Defined TDS Concentration:

Insert a user defined TDS concentration in the green box below to estimate PM_{10} and $PM_{2.5}$ emission rates.

TDS Concentration (ppmw)	Emission Factor (lb $PM_x/10^3$ gal)		Emission Rates			
			PM_{10}		$PM_{2.5}$	
	PM_{10}	$PM_{2.5}$	lb/hr	TPY	lb/hr	TPY
20,000	0.212	0.182	1.02	4.45	0.87	3.82

Western Refining Southwest, Inc. - Gallup Refinery
FCCU (Unit ESP)
NO_x Emission Calculation

Table A-1. 7-day NO_x concentration and Hourly NO_x Emissions from FCCU

Maximum 7-day NOx Concentration[1]	Proposed 7-day NOx Concentration[1]	Actual NO_x based on 7-day rolling basis[2]	Proposed NO_x based on 7-day rolling basis[2]
(ppmvd @ 0% O_2)	(ppmvd @ 0% O_2)	(lb/hr)	(lb/hr)
70	105	12.2	18.3

[1] The Maximum 7-day average concentration was taken from CEMS test data provided by Western. A 50% safety factor was added to the proposed 7-day NOx concentration.
[2] The Actual Maximum 7-day average emission rate was taken from CEMS test data provided by Western. A 50% safety factor was added to the proposed 7-day emission rate.

Table A-2. 365-day NO_x concentration and Annual NOx Emissions from FCCU

Average stack flowrate corrected to 0% O_2[1]	Stack Flowrate with 50% Safety Factor	365-day NO_x Concentration[2]	NO_x emissions based on 365-day NO_x concentration	Annual NOx Emissions[3]
(dscfm)	(dscfm)	(ppmvd @ 0% O_2)	(lb/hr)	(tpy)
23,340	35,010	65	16.6	72.5

[1] The stack flowrate value was obtained from 2014 CEMS test data provided by Western as the mean value listed under Flow Rates in the Data sheet provided in Section 7. The actual mean stack flowrate is 28,782 dscfm; however, the value listed here is corrected to 0% O_2
[2] The 65 ppmvd NOx concentration @ 0% O_2 was specified by Western.
[3] The annual NOx emissions were calculated using the following equation: 65 ppmv * 35,010 dscfm * (scf/ppmv *10^6 dscf) * (1 lb-mole/379.41 scf)* (46 lb NOx/1 lb-mole NOx)*(60 min/ hr)* (8760 hr/yr)*(1 ton/2000 lb)

Table A-3. Proposed Hourly NOx emissions for FCCU
FCCU Data

Maximum Stack Flowrate[1]	Maximum Stack Flowrate with 25% Safety Factor	Maximum NO_x 1-hr concentration[2]	NO_x emissions based on 1-hr NO_x concentration
(dscfm)	(dscfm)	(ppmv @ 0% O_2)	(lb/hr)
37,364	46,705	100	34.0

[1] This value was determined by analyzing 2017 (January through June) and 2016 PI data for the ESP stack at the facility. Any flow rates that were during SSM events were disregarded.
[2] This value was determined by analyzing 2017 (January through June) and 2016 PI data for the ESP stack at the facility. Any concentrations that were during SSM events were disregarded. A 25% safety factor was added to this value.

Table A-4. Permit Limits for FCCU NOx emissions (represented under unit ESP)

Unit ID	NO_x			
	Hourly (lb/hr)	Daily rolling 7-day average (lb/hr)	Daily rolling 365-day average (lb/hr)	Annual (tpy)
ESP	34.0	18.3	16.6	72.5

FCCU CO EMISSIONS CALCULATION
Western Refining Southwest, Inc. Gallup Refinery

Western Refining Southwest, Inc. - Gallup Refinery
FCCU (unit ESP)
CO Emission Calculation

FCCU Data - CO Hourly Emissions

Source ID	Source Name	Maximum Exhaust Gas Flow Rate[1] (scfm)	CO[2] (ppmv)
FB-1	FCCU CO Boiler (exhaust for FCCU)	46,705	422

[1] This value was determined by analyzing 2017 (January through June) and 2016 PI data for the ESP stack at the facility for the maximum flow rate. Any flow rates that were recorded during SSM events were disregarded. A 50% safety factor was added to the maximum flow rate for permitting purposes.

[2] FCCU is subject to the 500 ppmvd CO limit of 40 CFR 63, Subpart UUU. However, Western has reviewed the FCCU's highest CO concentrations during normal operations from 2016 through 2017 (January through June) to determine an actual hourly CO emission rate. A 100% safety factor was added to the maximum CO concentration value from this period.

FCCU Data - CO Annual Emissions

Emission Source	CO (ppmv)[1]	Average Exhaust Flow[2] (dscfm)
FCCU	85	35,010

[1] Western reviewed the FCCU's annual average CO concentration from 2015 through 2017. A 200% safety factor was added to the maximum of the annual average concentrations from 2015 through 2017.

[2] The stack flowrate value was obtained from 2014 CEMS test data provided by Western as the mean value listed under Flow Rates in the Data sheet provided in Section 7. The actual mean stack flowrate is 28,782 dscfm; however, the value listed here is corrected to 0% O_2 with a 50% safety factor added to it.

Controlled FCCU Emissions

Source ID	Source Name	CO (lb/hr)	CO (tpy)
FB-1	FCCU	87.26	57.5

Sample Calculation

CO Hourly Emissions:

$$\frac{421.8\ \text{ppmv}}{} \left| \frac{46{,}705\ \text{scf}}{\text{min}} \right| \frac{\text{scf}}{\text{ppmv} * 10^6\text{scf}} \left| \frac{1\ \text{lb-mol}}{379.41\ \text{scf}} \right| \frac{28.01\ \text{lb CO}}{1\ \text{lb-mol}} \left| \frac{60\ \text{min}}{\text{hr}} \right. = \frac{87.26\ \text{lb}}{\text{hr}}$$

CO Annual Emissions:

$$\frac{84.66\ \text{ppmv}}{} \left| \frac{35{,}010\ \text{scf}}{\text{min}} \right| \frac{\text{scf}}{\text{ppmv} * 10^6\text{scf}} \left| \frac{1\ \text{lb-mol}}{379.41\ \text{scf}} \right| \frac{28.01\ \text{lb CO}}{1\ \text{lb-mol}} \left| \frac{60\ \text{min}}{\text{hr}} \right| \frac{8760\ \text{hr}}{\text{yr}} \left| \frac{\text{ton}}{2000\ \text{lb}} \right. = \frac{57.51\ \text{ton}}{\text{yr}}$$

FCCU VOC EMISSIONS CALCULATION
Western Refining Southwest, Inc. Gallup Refinery

Western Refining Southwest, Inc. - Gallup Refinery
FCCU (unit ESP)
VOC Emission Calculation

FCCU Data - VOC emissions

Source ID	Source Name	Maximum Exhaust Gas Flow Rate (scfm)	Average Exhaust Gas Flow Rate (scfm)
FB-1	FCCU CO Boiler (exhaust for FCCU)	46,705	35,010

FCCU- VOC Emission Factors

Emission Source	Emission Factor[1] VOC ppmv
FCCU	18.29

[1] This emission factor is based on 2009 measured concentration data, below.

FCCU Emissions

Source ID	Source Name	VOC (lb/hr)	VOC (tpy)
FB-1	FCCU	5.9	19.51

Sample Calculation

VOC Hourly Emissions:

$$\frac{18.29\ \text{ppmv}}{} \left| \frac{46{,}705\ \text{scf}}{\text{min}} \right| \frac{\text{scf}}{\text{ppmv} * 10^6\text{scf}} \left| \frac{1\ \text{lb-mol}}{379.41\ \text{scf}} \right| \frac{44\ \text{lb VOC}}{1\ \text{lb-mol}} \left| \frac{60\ \text{min}}{\text{hr}} \right. = \frac{5.9\ \text{lb}}{\text{hr}}$$

VOC Annual Emissions:

$$\frac{5.94\ \text{lb}}{\text{hr}} \left| \frac{\text{ton}}{2000\ \text{lb}} \right| \frac{8760\ \text{hrs}}{\text{yr}} = \frac{19.51\ \text{tons}}{\text{yr}}$$

2009 Measured VOC Concentration Data

2009 Date	Measured
11/19/2009	14.3
11/19/2009	4.7
11/19/2009	10.8
11/20/2009	6.3
11/20/2009	4.7
11/20/2009	9.7
11/23/2009	9.3
11/23/2009	6.9
Average	8.34
StdDev	3.32
Avg+3sigma	18.29

Western Refining Southwest, Inc. - Gallup Refinery

FCCU (unit ESP)

SO_2 Emission Calculation

Table A-1. Short-Term Hourly Emissions from FCCU

Maximum Stack Flowrate[1] (dscfm)	Average Stack Flowrate[2] (dscfm)	7-day SO_2 Concentration[3] (ppmvd @ 0% O_2)	365-day SO_2 Concentration[3] (ppmvd @ 0% O_2)	SO_2 based on 7-day concentration (lb/hr)	SO_2 based on 365-day concentration (lb/hr)
46,705	35,010	100	50	47.3	17.74

[1] This value was determined by analyzing 2017 (January through June) PI data for the ESP stack at the facility. Any flow rates that were during SSM events were disregarded.

[2] Based on the 2014 mean stack flowrate corrected to 0% O_2 with a 50% safety factor added to it.

[3] These emission limits meet the requirements of the ASFO dated 1/22/09, Section VI.E.1.d(i)(A). They were estimated using 2011 baseline data.

SO_2 Hourly Emissions:

100 ppmv	46,705 dscf	scf	1 lb-mol	64 lb SO_2	60 min	=	47.27 lb
	min	ppmv * 10^6dscf	379.41 scf	1 lb-mol	hr		hr

Table A-1a. Short-Term Hourly Emissions from FCCU

Maximum Stack Flowrate (dscfm)	1-hr SO_2 Concentration[1] (ppmvd @ 0% O_2)	Hourly SO_2 Emission Rate (lb/hr)
46,705	208	98.3

[1] This value was determined by evaluating 2016 and 2017 (January through June) PI data for the maximum 1-hr SO_2 concentration for the ESP stack at the facility. Any concentrations during SSM events were disregarded. A 25% safety factor was added to the actual maximum 1-hr SO_2 concentration in 2016.

Table A-2. Long-Term Annual Emissions from FCCU

Average Stack Flowrate (dscfm)	365-day average SO_2 Concentration[1] (ppmvd @ 0% O_2)	SO_2 based on 365-day concentration (tpy)
35,010	44	68.94

[1] Annual emissions were calculated using a 365-day average concentration that was estimated using an average from 2016 and 2017 data. A 25% safety factor was added to this concentration.

SO_2 Annual Emissions:

44 ppmv	35,010 dscf	scf	1 lb-mol	64 lb SO_2	60 min	8760 hr	ton	=	68.94 tons
	min	ppmv * 10^6dscf	379.41 scf	1 lb-mol	hr	yr	2000 lbs		yr

Table A.3. FCCU Permitted SOx Emissions

Source ID	Source Name	SO_2 (lb/hr)	SO_2 (tpy)
ESP	FCCU	98.3	68.9

FCCU PM EMISSIONS CALCULATION
Western Refining Southwest, Inc. Gallup Refinery

Western Refining Southwest, Inc. - Gallup Refinery
FCCU (unit ESP)
TSP/PM_{10}/$PM_{2.5}$ Emission Calculation

Uncontrolled PM Emissions - Permit Allowables from NSR Permit 0633-M8-R6

Source ID	Source Name	PM (lb/hr)	PM (tpy)
FB-1	FCCU	45.8	98.8

Controlled PM Emissions - using Stipulated Order 1.0 lb PM/1000 lbs coke burned
A. Calculation of FCCU Maximum Air Blower Flowrate for Coke Burn Calculation

Maximum Air Blower Dry Flowrate

Maximum Air Rate	102,608	lb/hr	Maximum of mass air flow rate to catalytic cracking unit (Jan-May 2017)
Safety Factor	10%		Safety factor added per engineering judgemnent
Maximum Air Rate	**112,868**	lb/hr	(lb/hr) * (safety factor)
MW air	**28.96**	lb/lbmole	
Molar volume @ STP	**379.41**	dscf/lbmole	STP: 1 atm, 68 F
Maximum Air Rate	**24,645**	dscfm	(lb/hr)*(1/MW air)*(molar volume)*(hr/60 min)

Maximum Water Content of Air

Maximum Moisture Content	0.23	%, Mass	Facility provided data showed constant water content
Safety Factor	10%		Safety factor added per engineering judgemnent
Maximum Moisture Content	0.26	%, Mass	(%) * (safety factor)
Maximum Moisture Content	**0.41**	%, Volume	(%, Mass) * (MW air/MW water)

B. Calculation of FCCU Coke Burn Rate[1]

[1]Qa is maximum air blower flowrate from facility provided 2017 air blower dry mass flowrates with a 10% safety factor
%CO, $\%O_2$ are maximum values from facility provided data for the following time period: 1/1/17-5/31/17
Qoxy and $\%O_{xy}$ = 0 because FCCU does not have an oxygen-enriched air stream

Coke Burn Rate Equation from MACT UUU (40 CFR 63.1564(b)(4)(i))

Coke Burn Rate (R_c) = $K_1Qr(\%CO_2 + \%CO) + K_2Qa - K_3Qr[(\%CO/2) + \%CO_2 + \%O_2] + K_3Qoxy(\%O_{xy})$

Rc lb/hr coke burn rate
Qr dscfm exhaust gas from catalyst regenerator (upstream of CO boiler)
Qa dscfm air to catalyst cracking unit regenerator
$\%CO_2$ CO_2 concentration in regenerator exhaust, % by volume (dry basis)
%CO CO concentration in regenerator exhaust, % by volume (dry basis)
$\%O_2$ O_2 concentration in regenerator exhaust, % by volume (dry basis)
Qoxy dscfm oxygen-enriched air to catalyst cracking unit regenerator
$\%O_{xy}$ O_2 concentration in oxygen-enriched air stream, % by volume (dry basis)
K_1, K_2, K_3 Equation constants

Equation Constants

K_1 lb-min/hr-dscf-%	K_2 lb-min/hr-dscf	K_3 lb-min/hr-dscf-%
0.0186	0.1303	0.0062

FCCU Regenerator Data

Qr dscfm	Qa dscfm	$\%CO_2$	%CO[1]	$\%O_2$[2]	Qoxy dscfm	$\%O_{xy}$
26,835	24,645	18.01	3.53	5.90	0	0

[1] Maximum %CO from 1/1/17 through 5/31/17 data
[2] Maximum %O2 from 1/1/17 through 5/31/17 data

Volumetric Flowrate of Exhaust Gas from Catalyst Regenerator (Upstream of CO Boiler) Equation from MACT UUU (40 CFR 63.1573(a)(2))

$$\textbf{Volumetric Flowrate (Qr)} = \frac{79Qa + (100-\%Oxy)Qoxy}{100 - \%CO_2 - \%CO - \%O_2}$$

Sample Calculation

$$Qr: \frac{((79 * 24{,}770 \text{ dscfm}) + ((100 - 0\%) * 0 \text{ dscfm})}{(100\% - 18\% - 3.5\% - 1.75\%)} = 26{,}835 \text{ dscfm}$$

Coke Burn Rate

R_c lb/hr
9,691

FCCU PM EMISSIONS CALCULATION
Western Refining Southwest, Inc. Gallup Refinery

Average stack flowrate corrected to 0% O_2 (dscfm)	Maximum Stack Flowrate (dscfm)
23,340	46,705

C. Calculation of PM Emissions

FCCU PM Emission Factor [1]

Emission Source	Hourly	Annual	Condensable
	Filterable PM (lb PM/1000 lbs coke burned)[1]		PM (gr/dscf)[2]
FCCU (exhausting through ESP)	1.0	0.68	0.0027

[1] Filterable PM emission factor for the hourly PM emission calculation is from 01/22/09 Amended Order and has an effective date of 12/31/12.
Filterable PM emission factor for the annual PM emission calculation is based on 2017 testing data for when the ESP was operated with 5 fields in service. A 55% safety factor has been incorporated into the 2017 test result.

[2] Condensable PM factor was based on 2016 and 2017 stack testing data

Hourly FCCU Emissions

Source ID	Source Name	Coke Burn Rate[1] (lb/hr)	PM Filterable Emission Rate (lb/hr)	PM Condensable Emission Rate (lb/hr)	TSP (lb/hr)	PM_{10} (lb/hr)	PM2.5[2] (lb/hr)
ESP	FCCU	9691	9.7	1.08	10.8	10.8	9.0

[1] The coke burn rate used in the hourly emission calculation was calculated using an equation from MACT UUU, 40 CFR 63.1564(b)(4)(i)

[2] $PM_{2.5}$ emissions were calculated by applying a ratio of 83% to the PM_{10} emissions, following the calculation methodology of the current permitted emissions for $PM_{2.5}$

Annual FCCU Emissions

Source ID	Source Name	Coke Burn Rate[1] (lb/hr)	PM Filterable Emission Rate (lb/hr)	PM Condensable Emission Rate (lb/hr)	TSP (tpy)	PM_{10} (tpy)	PM2.5[2] (tpy)
ESP	FCCU	7723	5.3	0.54	25.4	25.4	21.1

[1] The coke burn rate used in the annual emission calculation was based on taking an average of the average coke burn rate in 2016 and 2017 (January-May 2017). A 20% safety factor was added to this value.

[2] $PM_{2.5}$ emissions were calculated by applying a ratio of 83% to the PM_{10} emissions, following the calculation methodology of the current permitted emissions for $PM_{2.5}$

Sample Calculation

PM_{10} Hourly Emissions:

$$\frac{1.0 \text{ lb PM}}{1000 \text{ lbs coke burned}} \times \frac{9{,}691 \text{ lbs coke burned}}{\text{hr}} = \frac{10.77 \text{ lb}}{\text{hr}}$$

PM_{10} Annual Emissions:

$$\frac{0.7 \text{ lb PM}}{1000 \text{ lbs coke burned}} \times \frac{7{,}723 \text{ lbs coke burned}}{\text{hr}} \times \frac{8760 \text{ hr}}{\text{yr}} \times \frac{\text{ton}}{2000 \text{ lb}} = \frac{25.44 \text{ tons}}{\text{yr}}$$

Sour Water Ammonia Ammonium Thiosulfate Solution (SWAATS) Gas Processing Unit Emission Factors [1]

Source ID	Source Name	CO (lb-mol/hr)	SO_2 (lb-mol/hr)
TV-1	SWAATS Gas Processing Unit	0.015	0.012

[1] CO and SO_2 emissions factors are based on manufacturing data of the vent gas scrubber overhead stream properties.

Hourly and Annual Emissions for SWAATS Unit [2]

Source ID	Source Name	CO (lb/hr)	SO_2 (lb/hr)	CO (tpy)	SO_2 (tpy)
TV-1	SWAATS Gas Processing Unit	0.42	0.77	1.84	3.37

[1] Hourly CO and SO_2 emissions are calculated using the stream concentration from the manufacturer and the molecular weight of each (28.0104 lb/lb-mol and 64.0588 lb/lb-mol, respectively).

Sample Calculation - TV-1, CO

Hourly Emissions: $$\frac{0.015\ \text{lb-mol}}{\text{hr}} \times \frac{28.0104\ \text{lb}}{\text{lb-mol}} = \frac{0.42\ \text{lb}}{\text{hr}}$$

Annual Emissions: $$\frac{0.42\ \text{lb}}{\text{hr}} \times \frac{8{,}760\ \text{hr}}{\text{yr}} \times \frac{\text{ton}}{2{,}000\ \text{lb}} = \frac{3.37\ \text{ton}}{\text{yr}}$$

Western Refining Southwest, Inc. - Gallup Refinery

Unit FUG-R
Total VOC and HAP Fugitive Emissions

Unit	FUG-R
Description	Facility-wide fugitives, excluding units TRUCK, RAIL, and TK-L

Total VOC Fugitive Emissions

Source	VOC Fugitive Emissions (lb/hr)	VOC Fugitive Emissions (tpy)
Alkylation	4.37	19.15
Boiler House	0.51	2.22
Crude	8.17	35.78
Diesel Hydrotreater	12.12	53.09
Fluidized Catalytic Cracking	4.94	21.64
Gas Concentration	8.92	39.09
BENSAT	0.27	1.16
Naptha Hydrotreater	4.67	20.45
Platformer	7.75	33.93
Saturated Gas	7.70	33.74
Sulfur Recovery	1.45	6.34
SWAATS	3.04	13.32
Treating	4.00	17.54
Pipe Rack Revamp	0.29	1.25
ALKY De-inventory	0.019	0.083
Total	68.2	298.8
Total with 5% Safety Factor	-	313.7

Total HAP Fugitive Emissions

Source	HAP Fugitive Emissions (lb/hr)	HAP Fugitive Emissions (tpy)
FUG-R & FUG-L HAP Emissions[1]	5.82	25.5
Proposed FUG-R & FUG-L limit with a 25% Safety Factor	7.3	31.8

[1] FUG-L emissions included here because FUG-R and FUG-L have a combined HAP limit.

Proposed Emission Limit

Source	VOC Fugitive Emissions (tpy)
FUG-R	313.7

UNIT FUG-L
Total VOC and HAP Fugitive Emissions

Unit	FUG-L[1]
Description	Fugitives associated with TRUCK, RAIL, and TK-L

[1] The emissions for this unit will not be changing with this application and are shown for informational purposes only, as FUG-R and FUG-L have a combined HAP limit.

Total VOC Fugitive Emissions

Source	**VOC Fugitive Emissions**	
	(lb/hr)	**(tpy)**
Biodiesel	0.28	1.16
Tank Farm[2]	14.85	65.05
Total	15.1	66.2
Total with a 10% Safety Factor	-	72.8
Permitted VOC emission limit for Unit FUG-L	-	74.7

[2] Fugitive emissions for the Truck & Rail Rack are incorporated under the Tank Farm source.

Total HAP Fugitive Emissions

Source	**HAP Fugitive Emissions**	
	(lb/hr)	**(tpy)**
FUG-R and FUG-L HAP Emissions[3]	5.82	25.5
Proposed FUG-R & FUG-L limit with a 25% Safety Factor	7.3	31.8

[3] FUG-R emissions included here because FUG-R and FUG-L have a combined HAP limit.

Proposed Emission Limit

Source	**VOC Fugitive Emissions**
	(tpy)
FUG-L	74.7

Facility-wide Fugitive Component Counts & Emissions

Component Count by Unit / Type [1]

Unit	Gas / Vapor				Light Liquid						Heavy Liquid					
	Valves	Compressor	PRV[2]	Flange/ Connect	Valves	Agitators	Pumps	PRV[2]	Drains	Flange/C onnect	Valves	Agitators	Pumps	PRV[2]	Drains	Flange/ Connect
Alkylation	422			1266	1115		12			3381	18					54
Boiler House	157			471	25		1			78						
Crude	384			1152	988		20		18	3024	277		9		53	858
Diesel Hydrotreater	819	3		2457	271		2		40	819	791		9			2400
Fluidized Catalytic Cracking	188			593	350		7		12	1125	243		9		43	794
Gas Concentration	413	4		1239	414		8		11	1266	48		2			150
Naptha Hydrotreater	487			1608	589		12		10	1984					20	
Platformer	450	3		1350	321		9		10	990					18	
Saturated Gas	393	2		1179	655		12		27	2001						
Sulfur Recovery	46			138	116		2		14	354						
SWAATS	213			639	32				34	96						
Treating	19			57	235		3		39	714	206		2			624
Tank Farm	450			1350	3224	3	96		3	9969	930	3	22			2865
Bensat					35		2		2	111						
Biodiesel											37		2		3	117
Pipe Rack Revamp	3			9	81					243	27					81
ALKY De-inventory	3			9	4					12						
Totals	**4,441**	**12**	**0**	**13,499**	**8,370**	**3**	**186**	**0**	**220**	**25,912**	**2,513**	**3**	**53**	**0**		**7,745**

Emission by Unit / Service / Component, lbs/hr [1]

Unit	Gas / Vapor				Light Liquid						Heavy Liquid					
	Valves	Compressor	PRV[2]	Connect[3]	Valves	Agitators	Pumps	PRV[2]	Drains[4]	Connect[3]	Valves	Agitators	Pumps	PRV[2]	Drains[4]	Connect[3]
Alkylation	0.44	0.00	0.00	0.70	1.17	0.00	0.16	0.00	0.00	1.86	0.01	0.00	0.00	0.00	0.00	0.03
Boiler House	0.16	0.00	0.00	0.26	0.03	0.00	0.01	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00
Crude	0.40	0.00	0.00	0.63	1.04	0.00	0.27	0.00	1.26	1.66	0.14	0.00	0.43	0.00	1.86	0.47
Diesel Hydrotreater	0.86	4.20	0.00	1.35	0.28	0.00	0.03	0.00	2.80	0.45	0.40	0.00	0.43	0.00	0.00	1.32
Fluidized Catalytic Cracking	0.20	0.00	0.00	0.33	0.37	0.00	0.10	0.00	0.84	0.62	0.12	0.00	0.43	0.00	1.51	0.44
Gas Concentration	0.43	5.60	0.00	0.68	0.43	0.00	0.11	0.00	0.77	0.70	0.02	0.00	0.10	0.00	0.00	0.08
Naptha Hydrotreater	0.51	0.00	0.00	0.88	0.62	0.00	0.16	0.00	0.70	1.09	0.00	0.00	0.00	0.00	0.70	0.00
Platformer	0.47	4.20	0.00	0.74	0.34	0.00	0.12	0.00	0.70	0.54	0.00	0.00	0.00	0.00	0.63	0.00
Saturated Gas	0.41	2.80	0.00	0.65	0.69	0.00	0.16	0.00	1.89	1.10	0.00	0.00	0.00	0.00	0.00	0.00
Sulfur Recovery	0.05	0.00	0.00	0.08	0.12	0.00	0.03	0.00	0.98	0.19	0.00	0.00	0.00	0.00	0.00	0.00
SWAATS	0.22	0.00	0.00	0.35	0.03	0.00	0.00	0.00	2.38	0.05	0.00	0.00	0.00	0.00	0.00	0.00
Treating	0.02	0.00	0.00	0.03	0.25	0.00	0.04	0.00	2.73	0.39	0.10	0.00	0.10	0.00	0.00	0.34
Tank Farm[5]	0.47	0.00	0.00	0.74	3.39	0.0093	1.31	0.00	0.21	5.48	0.47	0.14	1.05	0.00	0.00	1.58
Bensat	0.00	0.00	0.00	0.00	0.04	0.00	0.03	0.00	0.14	0.06	0.00	0.00	0.00	0.00	0.00	0.00
Biodiesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.10	0.00	0.11	0.06
Pipe Rack Revamp	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.13	0.01	0.00	0.00	0.00	0.00	0.04
ALKY De-inventory	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Totals	**4.67**	**16.79**	**0.00**	**7.43**	**8.88**	**0.0093**	**2.54**	**0.00**	**15.40**	**14.39**	**1.30**	**0.14**	**2.63**	**0.00**	**4.80**	**4.37**

[1] Component quantities provided by Loretta Morgan (Western), ran for December 31, 2013, with the exception of flanges/connectors which were calculated based on 3 times the total valves and pumps. Counts for Biodiesel and Pipe Rack Revamp were obtained from the last Title V renewal application.

[2] All pressure relief valves are vented to the flare and are not included in the component counts.

[3] The emission factors for flanges and connectors are the same for all services. The values shown in the "Emission Factors" sheet are used to calculate the emission rates.

[5] Emissions for these units are calculated based on component counts provided by Loretta Morgan (Western) December 31, 2013 with the exception of Biodiesel, which is carried forward from the last Title V renewal application.

[5] Fugitive components for the Truck & Rail rack are incorporated under the Tank Farm source and represented under the emission unit FUG-L

Fugitive Component Emission Factors

Component Type	Service	Normal[3] Leak Rate (kg/hr/source)	Normal Leak Rate (lb/hr/source)	Leaky[3] Leak Rate (kg/hr/source)	Leaky Leak Rate (lb/hr/source)	Emission Factor Source
Valve[1]	Gas	0.00024	0.00052	0.01230	0.02706	EPA Protocol For Equipment Leak Emission Estimates, Table 2-10
	Light Liquid	0.00024	0.00052	0.01230	0.02706	EPA Protocol For Equipment Leak Emission Estimates, Table 2-10
	Heavy Liquid	0.00023	0.00051	0.00023	0.00051	EPA Protocol For Equipment Leak Emission Estimates, Table 2-2
Agitators[2]	Light Liquid	0.00120	0.00263	0.01198	0.02636	EPA Protocol For Equipment Leak Emission Estimates, Table 2-10
	Heavy Liquid	0.021	0.04620	-	-	EPA Protocol For Equipment Leak Emission Estimates, Table 2-2
Open-ended Lines	Gas	0.0023	0.00506	-	-	EPA Protocol For Equipment Leak Emission Estimates, Table 2-2
	Light Liquid	0.0023	0.00506	-	-	EPA Protocol For Equipment Leak Emission Estimates, Table 2-2
	Heavy Liquid	0.0023	0.00506	-	-	EPA Protocol For Equipment Leak Emission Estimates, Table 2-2
Flanges	Gas	0.00025	0.00055	-	-	EPA Protocol For Equipment Leak Emission Estimates, Table 2-2
	Light Liquid	0.00025	0.00055	-	-	EPA Protocol For Equipment Leak Emission Estimates, Table 2-2
	Heavy Liquid	0.00025	0.00055	-	-	EPA Protocol For Equipment Leak Emission Estimates, Table 2-2
Pumps[2]	Light Liquid	0.00519	0.01142	0.05644	0.12416	EPA Protocol For Equipment Leak Emission Estimates, Table 2-10
	Heavy Liquid	0.021	0.04620	0.05644	0.12416	EPA Protocol For Equipment Leak Emission Estimates, Table 2-2
Compressors	Gas	0.636	1.40	-	-	EPA Protocol For Equipment Leak Emission Estimates, Table 2-2
Process Drains	Light Liquid	0.03	0.07	-	-	AP-42, 4th Ed., Table 9.1-2
	Heavy Liquid	0.008	0.035	-	-	AP-42, 4th Ed., Table 9.1-2 for uncontrolled drains 50% Control applied for water sealed drains per EPA-450/3-85-001a (02/85)
Connectors	Gas	0.00025	0.00055	-	-	EPA Protocol For Equipment Leak Emission Estimates, Table 2-2
	Light Liquid	0.00025	0.00055	-	-	EPA Protocol For Equipment Leak Emission Estimates, Table 2-2
	Heavy Liquid	0.00025	0.00055	-	-	EPA Protocol For Equipment Leak Emission Estimates, Table 2-2
Pressure Relief Valve	Gas	0.16	0.35	-	-	EPA Protocol For Equipment Leak Emission Estimates, Table 2-2

Western Refining Southwest, Gallup Refinery
Cooling Tower VOC Emissions

Unit ID CT-1/2

Table A-1. Cooling Tower Emission Parameters Based on MACT CC Monitoring Requirements

Source Name	Design Water Flow Rate[1] (gpm)	# of Leak Days[2] (day)	MACT CC No-Leak VOC (ppm_v)	Max. Monitored Leak VOC[3] (ppm_v)	Average Monitored Leak VOC[4] (ppm_v)
CT-1/2	9,000	150	6.2	1,300	300.0

[1] Cooling Tower Design Specification sheet
[2] Based on # of days cooling water VOC monitoring data indicated leaks from heat exchangers since MACT CC monitoring requirements.
[3] Maximum VOC concentration in cooling water measured in 2015
[4] Average VOC concentration from cooling water samples taken in 2015 with readings exceeding the leak level defined in MACT CC (6.2 ppmv)

Table A-2. El Paso Test Method Parameters

Parameter	Description	Max.	Average	Units
a	Sample Water Flow rate	125	125	mL/min
b	Stripping Air Flow rate	2,500	2,500	mL/min
c	VOC concentration in stripped air	monitored	monitored	ppm_v
M	Molecular Weight of Hydrocarbon	16	16	g/mol
P	Pressure in Stripping Chamber	0.77	0.77	atm
R	Universal Gas Constant	82.054	82.054	mL atm/mol K
T	Stripping Chamber Temperature	25	10	C
-	Density of Water	8.34	8.34	lb/gal

[1] MACT CC adopted the TCEQ Sampling Procedures Manual, Appendix P, Cooling Tower Monitoring, Section 7.

VOC concentration in water (C, ppmw):

$$C = \frac{M \times (P \times 0.03342 \frac{atm}{inHg}) \times b \times c}{R \times (T + 273) \times a}$$

Table A-3. VOC Content of Cooling Water

Source Name	No-Leak VOC in Cooling Water (ppm$_w$)	Max. VOC in Cooling Water (ppm$_w$)	Average VOC in Cooling Water (ppm$_w$)
CT-1/2	0.062	13.08	3.2

Table A-4. Cooling Tower VOC Emissions

Source Name	Max. Hourly VOC (w/Leak) (lb/hr)	Annual VOC (wo/Leak) (tpy)	Annual VOC (w/Leak) (tpy)	Total Annual VOC (tpy)
CT-1/2	**58.90**	0.72	25.8	**26.5**

Western Refining Southwest, Gallup Refinery
Cooling Tower HAP Emissions

Source ID	Hourly VOC Emissions (lb/hr)	Annual VOC Emissions (tpy)
CT-1/2	58.90	26.49

Table B-1. Stream HAP Speciation [1]

Process Stream	HAPs Defined in Section 112 (b) of Clean Air Act												TAPs Listed in 20.2.72.502 NMAC				
	2,2,4-Trimethylpentane (ppmw)	Benzene (ppmw)	Cumene (ppmw)	Ethyl benzene (ppmw)	Hexane (ppmw)	Naphthalene (ppmw)	PAC (ppmw)	Toluene (ppmw)	Xylene (mixed isomers) (ppmw)	Lead (ppmw)	Mercury Compounds (ppmw)	Nickel Compounds (ppmw)	1,2,4-Trimethylbenzene (ppmw)	Ammonia (ppmw)	Cyclohexane (ppmw)	Copper Compounds (ppmw)	Vanadium Compounds (ppmw)
CT-1/2	12,293	4,372	352	1,945	18,292	858	22	66,635	11,229	0.077	0.0020	0.16	3,531	3,800	6,583	0.010	0.14

[1] Average HAP speciation of all process streams associated with fugitive emissions, per facility-wide fugitive emission calculation currently permitted.

Table B-2. Hourly HAP Emissions from Cooling Towers

Emission Source	HAPs Defined in Section 112 (b) of Clean Air Act												TAPs Listed in 20.2.72.502 NMAC					Total HAP Emissions (lb/hr)	Proposed HAP emission limit[1] (lb/hr)
	2,2,4-Trimethylpentane (lb/hr)	Benzene (lb/hr)	Cumene (lb/hr)	Ethylbenzene (lb/hr)	n-Hexane (lb/hr)	Naphthalene (lb/hr)	PAC (lb/hr)	Toluene (lb/hr)	Xylene (lb/hr)	Lead (lb/hr)	Mercury (lb/hr)	Nickel (lb/hr)	1,2,4-Trimethylbenzene (lb/hr)	Ammonia (lb/hr)	Cyclohexane (lb/hr)	Copper (lb/hr)	Vanadium (lb/hr)		
CT-1/2	0.72	0.26	0.021	0.11	1.1	0.051	0.0013	3.9	0.66	4.5E-06	1.2E-07	9.4E-06	0.21	0.22	0.39	5.6E-07	8.4E-06	6.8	8.2

[1] Requested a 20% safety factor for the proposed hourly HAP emission limit

Table B-3. Annual HAP Emissions from Cooling Towers

Emission Source	HAPs Defined in Section 112 (b) of Clean Air Act												Total HAP Emissions (tpy)	Proposed HAP emission limit[1] (tpy)
	2,2,4-Trimethylpentane (tpy)	Benzene (tpy)	Cumene (tpy)	Ethylbenzene (tpy)	n-Hexane (tpy)	Naphthalene (tpy)	PAC (tpy)	Toluene (tpy)	Xylene (tpy)	Lead (tpy)	Mercury (tpy)	Nickel (tpy)		
CT-1/2	0.33	0.12	0.0093	0.052	0.48	0.023	0.00057	1.8	0.30	2.0E-06	5.2E-08	4.2E-06	3.1	3.7

[1] Requested a 20% safety factor for the proposed annual HAP emission limit

Unit AC-12

Unit ID	AC-12	
Description	CI RICE	
Make/Model	Caterpillar/C13	
Maximum Capacity	440	hp
	328	kW
Fuel Usage	22.7	gal/hr
Manufacture Date	2013	
Installation Date	5/2/2016	
EPA Engine Tier	Tier 3	
Annual Hours of Operation	8760	hrs

Uncontrolled Emissions for Atlas Copco Air Compressor[1]

NO_x[1,2]	CO[1]	VOC[1,2]	SO_2[3]	TSP[1]	PM_{10}[4]	$PM_{2.5}$[4]	
3.8	3.5	0.20	-	0.20	0.20	0.20	g/kw-hr
-	-	-	15	-	-	-	ppmw
2.75	2.53	0.14	0.0048	0.14	0.14	0.14	lb/hr
12.04	11.09	0.63	0.021	0.63	0.63	0.63	tpy

[1] Per engine emissions data
[2] The NMHC + NOx factor in the engine certification is 4.0 g/kW-hr. The NOx and NMHC factors were assumed to be 95% and 5% of the combined factor, respectively.
[3] Assumed density of ultra-low sulfur diesel (ULSD) to be 7.1 lb/gal; ULSD shall contain no more than 15 ppmw total sulfur.
SO_2 (lb/hr) = 0.000015 S * 25.6 gal/hr * 7.1 lb/gal * 64.06 lb SO_2/ 32.06 lb S
[4] TSP=PM10=PM2.5

HAP Emissions

Compound		Emission Factor[1]	Emission Factor[2]	Emissions	
Pollutant	**Species**	**(lb/MMBtu)**	**(lb/hp-hr)**	**(lb/hr)**	**(tons/yr)**
Hazardous Air Pollutants	Benzene	9.33E-04	6.5E-06	2.9E-03	1.3E-02
	Acetaldehyde	7.67E-04	5.4E-06	2.4E-03	1.0E-02
	Acrolein	9.25E-05	6.5E-07	2.8E-04	1.2E-03
	Formaldehyde	1.18E-03	8.3E-06	3.6E-03	1.6E-02
	Naphthalene	8.48E-05	5.9E-07	2.6E-04	1.1E-03
	Toluene	4.09E-04	2.9E-06	1.3E-03	5.5E-03
	Xylenes	2.85E-04	2.0E-06	8.8E-04	3.8E-03
TOTAL				**0.012**	**0.051**

[1] HAP emissions are obtained from AP-42 Table 3.3-2
[2] To convert from lb/MMBtu to lb/hp-hr, the following factor was used 7000 Btu/hp-hr

Stack Parameters

28.7	m	stack height
410.9	K	stack temperature
33.02	m/s	stack velocity
0.42	m^3/s	stack flowrate
0.127	m	stack diameter

Diesel engine generator for multiple refinery activities

Unit ID	GEN-1	
Unit Description	Diesel engine generator for multiple refinery activities	
Manufacturer	Caterpillar	
Model #	3306B DI	
Engine Rating	382	hp
Fuel Usage	18.9	gal/hr
Diesel heat value	137,000	Btu/gal
Heat Input	2.59	MMBtu/hr
Operating Hours[1]	8760	hr/year

UNCONTROLLED EMISSIONS (PER)

NO_x[1]	CO[1]	VOC[1]	SO_2[2]	TSP[1,3]	PM_{10}[1,3]	$PM_{2.5}$[1,3]		Notes
-	-	-	15	-	-	-	ppmw	
4.29	0.95	0.12	0.0040	0.11	0.11	0.11	lb/hr	
18.79	4.16	0.53	0.018	0.48	0.48	0.48	tpy	Emissions (8760 hr/yr)

[1] Per engine emissions data found here: http://www.energy.ca.gov/sitingcases/tracypeaker/documents/applicants_files/afc_cd-rom/VOL_II_APPENDICES/Appendix%20B%20(Air%20Quality)/Emergency%20Generator%20Vendor%20Data

[2] Assumed density of ultra-low sulfur diesel (ULSD) to be 7.1 lb/gal; ULSD shall contain no more than 15 ppmw total sulfur.

SO_2 (lb/hr) = 0.000015 S * 18.9 gal/hr * 7.1 lb/gal * 64.06 lb SO_2/ 32.06 lb S

[3] TSP=PM10=PM2.5

FEDERAL HAP EMISSIONS

Compound		Emission Factor (lb/MMBtu)[1]	Actual HAP Emissions	
Pollutant	Species		(lb/hr)	(tpy)
Hazardous Air Pollutants	Benzene	9.33E-04	2.42E-03	1.06E-02
	Acetaldehyde	7.67E-04	1.99E-03	8.70E-03
	Acrolein	9.25E-05	2.40E-04	1.05E-03
	Formaldehyde	1.18E-03	3.06E-03	1.34E-02
	Naphthalene	8.48E-05	2.20E-04	9.62E-04
	Toluene	4.09E-04	1.06E-03	4.64E-03
	Xylenes	2.85E-04	7.38E-04	3.23E-03
TOTAL			**9.7E-03**	**4.3E-02**

[1] HAP emission factors were obtained from Table 3.3-2 in USEPA AP-42 Section 3.3 "Gasoline And Diesel Industrial Engines" (10/96).

Western is proposing to install two new Evaporators near Evaporation Pond 3 (EP-3). The Evaporators will allow Western, as a zero discharge facility, to more effectively manage the wastewater impoundment system. The Evaporators result in emissions of particulate matter, VOC, and HAPs.

Particulate emission calculations for the new evaporators are based on emission factors derived from on-site monitoring. A summary of the monitoring results used to derive the site-specific factors is included in Section 7 of this application. Based on a maximum TDS content of 12,000 ppm in the wastewater, the derived emission factor for TSP, PM_{10}, and $PM_{2.5}$ is 0.109 lb PM per 1,000 gallons sprayed. This equates to 0.432 lb/hr per 66 gpm Evaporator, or 0.864 lb/hr (3.78 tpy) total for both Evaporators as shown below:

PM (lb/hr) = (0.109 lb/1000 gal) x (66 gal/min) x (60 min/hr)
= 0.432 lb/hr PM for one Evaporator
= 0.864 lb/hr PM total for both Evaporators
= 3.78 tpy PM total for both Evaporators, based on 8,760 hours per year

Based on monitoring data, it is assumed that TSP, PM_{10}, and $PM_{2.5}$ emissions are equivalent.

VOC and HAP emissions are already permitted and are fully accounted for in emission unit WWS (see June 2011 permit application for the modified wastewater treatment system). Therefore, Western is not requesting VOC or HAP limits on the new Evaporators. The impoundment evaporation emissions included in the 2011 WWS permit application are show below.

Western Refining Southwest, Inc. - Gallup Refinery

Waste Water System Emissions

NAPIS	Mass flow	DGF		MPPE		STP-1 and EP-2 through EP-12	
Process water	440 gal/min	500	Cannister outlet (ppmv)[2]	0.50	Benzene concentration to ponds (mg/L)[6]	1.0	Fraction evaporated
Process water	99935 L / hr	3531	Outbreathing (scf/hr)[3]	98.1%	Calculated MPPE Benzene Reduction Efficiency		
Cannister reduction	90% efficiency	100	Effluent-1 (ppmw)[4]				

	Influent Mass flow[1]		Effluent-1	Vapor[5]	Effluent-2[8]	Recovered Oil[5,7] Liquid	Recovered Oil[5,7] Vapor	Impoundment Evaporation		
	mg / l	lb / hr	mg/L	lb/hr	mg/L	lb/hr	lb/hr	lb/hr	tpy	
Benzene	26.00	5.73	26.00	0.39	0.50	5.62	0.0011	0.11	0.48	Benzene
Toluene	60.00	13.22	60.00	0.07	1.15	12.96	0.0007	0.25	1.11	Toluene
Ethylbenzene	5.60	1.23	5.60	0.01	0.11	1.21	0.00002	0.02	0.10	Ethylbenzene
Xylenes	34.00	7.49	34.00	0.04	0.65	7.35	0.0001	0.14	0.63	Xylenes
Other VOC	343.75	75.73	100.00	0.001	1.92	21.61	0.0005	0.42	1.86	Other VOC
Total VOC	469.35	103.41	225.60	0.53	4.34	48.75	0.00	0.96	4.19	Total VOC

[1] BTEX and "Other VOC" estimate based on lab analyses from 2008-2010. "Other VOC "is the sum of hydrocarbon emissions and a safety factor of : 25%
BTEX concentrations are based on maximum detected values with a safety factor of: 100%
[2] "No detectable emission" level as defined by §61.341. (NESAHP FF, Benzene Waste Operations). This level is applied to the "Total VOC" emissions; see Note 5 for calculation method.
[3] Maximum outbreathing rate (DGF design specification).
[4] Manufacturer's maximum specification for oil and grease removal (50 ppmw) with 100% safety factor. Applies only to "Other VOC".
BTEX is assumed to "pass through" to conservatively estimate downstream process emissions.
[5] "Total VOC "Mass flow rate = Cannister outlet$_{ppmv}$ * standard molar outbreathing flowrate based on nitrogen ambient * MW$_{TotalVOC}$. The MW for "Total VOC" is conservatively assumed to be natural gasoline (MW = 114.332).
Individual species flow rates are based on the ratio of Influent-1 concentrations. Venting occurs from both the DGF and MPPE Recovered Oil Tank to a common cannister system.
[6] Limit for hazardous solid waste.
[7] Oil liquid is based on the difference between the mass flow rates from Effluent-1 and Effluent-2. Vapor emission based on TANKS 4.09d
[8] Benzene concentration is set to the hazardous solid waste limit. Removal efficiency for other species is based on the "Calculated MMPE Reduction Efficiency" which is determined by the benzene reduction from Effluent-1 to Effluent-2.

VOC Emission Summary

	Benzene		Toluene		Ethylbenzene		Xylenes		Other VOC		Total VOC		Total VOC Emissions with a 20% safety factor	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
NAPIS[9]	0.029	0.13	0.067	0.30	0.006	0.03	0.038	0.17	0.387	1.69	0.53	2.31		
DGF Feed Tank[10]	0.076	0.335	0.047	0.204	0.001	0.005	0.005	0.023	0.117	0.511	0.25	1.08		
DGF Vapor	0.389	1.70	0.068	0.30	0.006	0.03	0.039	0.17	0.533	2.33	0.53	2.33		
MPPE Recovered Oil Vapor	0.001	0.005	0.001	0.003	0.15	0.00	0.0001	0.0005	0.00	0.00	0.00	0.01		
Net Fugitive Emissions	0.003	0.01	0.008	0.03	0.001	0.00	0.004	0.02	0.043	0.19	0.06	0.26		
Evaporation	0.11	0.48	0.25	1.11	0.02	0.10	0.14	0.63	0.42	1.86	0.96	4.19		
Total	0.61	2.67	0.44	1.95	0.19	0.82	0.23	1.01	1.50	6.59	2.32	10.18	2.79	12.22

[9] AP-42 Table 5.1-2, Fugtive Emission Factors for Petroleum Refineries. Covered oil/water separator emission factor is 0.2 lb oil/1000 gal waste water.
Input to the NAPIS is estimated at 440 gpm. BTEX and Other/VOC emissions are based on ratio of the component to total VOC. Assumes conservative cannister reduction efficiency.
[10] DGF Feed Tank emissions are based on TANKS 4.09d working and breathing losses and are controlled by the carbon cannisters common to the NAPIS.

While VOC emissions are already accounted for in the permit (via emission point WWS), Western is providing the following demonstration that potential VOC emissions emanating from the new Evaporators are less than the 1 lb VOC/hr limit for technical revisions. Western is not requesting a new VOC limit for the Evaporators since the emissions are already accounted for in the current NSR permit.

A total VOC effluent rate of 4.34 mg/L from the MPPE unit (Effluent 2 in the above table) is used with the Evaporator flow rate of 66 gpm as follows to derive potential hourly emissions of VOC:

VOC (lb/hr) = (4.34 mg VOC/L effluent) x (1 L/0.26417 gal) x (2.2046E-06 lb / 1 mg) x (66 gal / min) x (60 min / hr)

= 0.143 lb VOC/hr per Evaporator
= 0.29 lb/hr total for both Evaporators

The Evaporators will service wastewater with a maximum TDS of 12,000 ppm.

Western is requesting the flexibility to run the Evaporators 8,760 hours per year.

Table A-1. Annual Tank VOC Emissions during Normal Operation [1]

Tank	Tank Data Volume (gallons)	Througput (gal/yr)	1.2xTurnovers	1.2xThroughput (gal/yr)	VOC (lb/yr)	VOC (tpy)
TK-7	84,000	54,750	0.78	65,700	7.48	3.74E-03
TK-8	84,000	54,750	0.78	65,700	7.48	3.74E-03
Total						***0.01***

[1] Per U.S. EPA TANKS 4.09d program output.

Table A-2 Biodiesel - Material Characteristics

Vapor Pressure	0.0059	psia	Facility provided @ 60 F
Vapor Molecular Weight	117	lb/lb-mole	Facility provided

Table A-3 Biodiesel Unloading Throughput Data

Railcar capacity	650	bbl/railcar
Number of railcars per hour	1	railcar/hr
Number of railcars per year	168	railcar/year
Hourly Throughput	650	bbl/hr
Daily Throughput	300	bbl/day
Annual Throughput	109,500	bbl/yr
Loading Rack Control Device	flare	
Loading Rack Purge Gas	Nitrogen	

Table A-4 New Components for Project (Unloading, Storing, Blending, Blended Biodisel Loading) [1]

Component	**Count**
Flange set - not at a valve	46
Valve - flanged	37
Pumps	2
Process Drains	3
Other connections not listed above	0

Notes [1] Per 12/13/11 spreadsheet

Table A-5 Blended Diesel/Biodiesel - Material Characteristics

Vapor Pressure	0.0074	psia	TANKS 4.09d data for facility diesel
Vapor Molecular Weight	130	lb/lb-mole	TANKS 4.09d data for facility diesel
% Biodiesel to be Blended with Diesel	20	%	Facility provided

Table A-6 Blended Diesel/Biodiesl Data and Loading Type[1]

Truck capacity	175	bbl/truck
Number of trucks per hour	2	truck/hr
Number oftrucks per year	13,140	railcar/year
Hourly Throughput	350	bbl/hr
Daily Throughput	6,300	bbl/day
Annual Throughput	2,299,500	bbl/yr
Loading Type	submerged	splash or submerged
Service Type	normal	normal or vapor balance

Notes [1] Per 12/13/11 spreadsheet

Table F-1. Total Emissions from Proposed Biodiesel Storage and Loading Facilities

Activities	**Proposed VOC Emissions** Maximum Hourly (lb/hr)	**Proposed VOC Emissions** Annual (tpy)
Storage Tanks	-	0.01
Flaring	1.39E-03	1.17E-04
Fugitives	0.40	1.74
Loading Loss	0.34	1.11
Unloading Loss	7.54E-05	6.35E-06
Total	***0.74***	***2.86***

	Permit	Date	VOC (tpy)
Total Liquid Loading Emissions from Truck Rack			35.82
Total Liquid Loading Emissions from Rail Rack			1.53
Total Fugitive Emissions from Truck Rack			0.36
Total Fugitive Emissions from Rail Rack			0.10
Truck Rack			0.36
Total Truck Rack			36.53
Total Rail Rack			1.62
M16R1			
Total TRUCK			36.7
Total RAIL			1.6

Table A-7 Materials Transferred at a Truck Rack[1]

Material Transferred	Material Type	Loading or Unloading	Control Device
Blended Diesel/Biodiesel	Liquid	Loading	-

Table A-8 Materials Transferred at a Rail Rack

Material Transferred	Material Type	Loading or Unloading	Control Device
Biodiesel	Liquid	Unloading	Flare

Table A-9 Liquid Loading Losses[1,2,3]

Source ID	Material Transferred	Vapor Molecular Weight (lb/lb-mole)	True Vapor Pressure (psia)	Saturation Factor [1]	Average Temperature (°R)	Loading Loss [2,3] (lb/10^3 gal)	Control Device	Control Efficiency [4] (%)	Collection Efficiency (%)	Hourly Throughput (bbl/hr)	Annual Throughput (bbl/yr)	Hourly Loading Emissions (lb/hr)	Annual Loading Emissions (tpy)
Truck Rack	Blended Diesel/Biodiesel	130	0.0074	1.00	520	0.023	None	0%	0.0%	350	2,299,500	0.34	1.11
											Total Liquid Loading Emissions from Truck Rack		1.11

[a] Vapor Molecular Weight, True Vapor Pressure and Average Temperature acquired from TANKS database for 2009 NSR Application for Gallup Refinery.
[b] Annual throughput provided by Ed Riege 7/1/11.
[1] Per U.S. EPA AP-42 Section 5.2 Transportation And Marketing Of Petroleum Liquids, Table 5.2-1.
[3] Per methodology described in U.S. EPA AP-42 Section 5.2 Transportation And Marketing Of Petroleum Liquids.

Sample Calculation - Crude (Rail Rack)

Loading Loss:	12.46	130 lb / lb-mole	0.01 psia	1.00	1 / 519.6 °R	=	0.02 lb / 10^3 gal
Annual Loading Emissions:	0.023 lb / 1,000 gal	2,299,500 bbl / yr	42 gal / bbl	100% - 00.00%	ton / 2,000 lbs	=	1.11 ton / yr

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Table A-10 Liquid Unloading Losses (Hose Disconnect Fugitive Emissions)

Source ID	Material Transferred	Loading or Unloading	Loading Arm Diameter (in)	Soft Hose Length (ft)	Loading Arm Pipe Length (ft)	Loading Arm Overpressure (psig)	Depressurived Volume[1] (ft^3/railcar)	Gas Molecular Weight (lb/lb-mole)	True Vapor Pressure (psia)	Annual Throughput (bbl/yr)	Fugitive Emissions (lb/railcar)	Hourly VOC Emissions (lb/hr)	Annual VOC Emissions[2] (tpy)
Rail Rack	Biodiesel	Unloading	4	6	10	1	0.62	117	5.90E-03	109,500	7.54E-05	7.54E-05	6.35E-06
										Total Fugitive Emissions from Rail Rack			6.35E-06

[a] Vapor Molecular Weight and True Vapor Pressure acquired from TANKS database for 2009 NSR Application for Gallup Refinery.
[1] The hose will be capped as soon as it is disconnected from the truck or railcar. It is assumed, all of the vapor from the soft hose is released (worst case emissions) and all of the vapor from the pipe above atmospheric pressure (14.7 psia) or gauge pressure
The vapor area released is calculated by taking the volume of the hose and piping multiplied by the pressure fraction released. The entire volume of the hose is assumed to be released, but only the presssure above atmospheric or gauge pressure of the pipe
Ex. ($Diameter^2$ x Pi ÷ 4) x [Hose length x (psia ÷ 14.7 psi) + Pipe length x (psig ÷ 14.7 psi)]
[2] Annual emissions are based on the annual throughput and the number of trucks and railcars necessary to deliver the annual amount of material. The number of trucks and railcars is based on the capcaity of each (i.e., 8,000 gallons and 660 barrels, respectively)
[3] For hourly emissions, it is assumed that the truck rack can unload 6 trucks per hour and the rail rack can unload 1 railcars per hour.

Sample Calculation - Fuel Oil (Rail Rack)

Depressurized Volume:	8.73E-02 square ft	6 ft	(1 psig + 14.7 psia) / 14.7 psia	+	10 ft	1 psig / 14.7 psia	=	0.62 cubic ft / railcar
Unloading Emissions:	0.62 cubic ft / railcar	lb-mol / 385.4 cubic ft	117 lb / lb-mol	5.90E-03 psia	1 / 14.7 psia	=	7.54E-05 lb / railcar	
Annual Emission:	7.54E-05 lb / railcar	109,500 bbl / yr	railcar / 740 bbl	ton / 2000 lb	=	6.35E-06 ton / yr		

Rail Rack Unloading for Biodiesel - Gallup Refinery

Table A-11. Rail Car Operating Data

rail car headspace[1]	100	bbl/car
rail car headspace	561	cf/car
rail car volume	650	bbl/car
rail car volume	3,649	cf/car
railcar headspace over pressure after unloading[1]	8	psig
railcar depressurized after unloading remaining pressure	1	psig
Biodiesel average vapor pressure	0.0059	psia
Biodiesel vapor average molecular weight	117	lb/lb-mole
Biodiesel VOC volume (initial) in rail car[2]	0.23	scf/car
total gas volume in pressurized railcar[3]	5635.57	scf/car
total gas volume remaining in rail car after depressurization[4]	3897.73	scf/car
total gas volume released to flare[5]	1737.84	scf/car
Biodiesel VOC to flare[6]	0.23	scf/car
Typical headspace biodiesel VOC heat content	6249	Btu/scf
Potential Heating value from biodiesel VOC[7]	1.41E-03	MMBtu/car
Purge gas heating value - using N_2	0	Btu/scf
Purge gas with biodiesel VOC total heat rate	1.41E-03	MMBtu/car
Target Heating value of gas to be flared	350	Btu/scf
Assist Gas heating value	1000	Btu/scf
Assist Gas to increase BTU of biodiesel VOC sent to flare	2.05	scf/car
Potential Heating value from assist gas	2.05E-03	MMBtu/car
Total heating value (biodiesel VOC, purge gas, assist gas)	6.37E-04	MMBtu/car

[1]Based on Mr. Don Riley at Western Gallup Refinery and adjusted with a safety factor for maximum hourly emission rate

[2]Vrail car headspace * (Crude average vapor pressure)/14.7; Assumed railcar orignially loaded with crude under 14.7 psia

[3]Vrail car * (Overpressure + 14.7)/14.7; assumes rail car arrives at ~0 PSIG; conservative. VOC volume in car makes little difference

[4]Vrail car * (Remaining Pressure + 14.7)/14.7; railcar does not completely empty; portion of gas (purge + VOC) remains

[5]Vrail car * (Overpressure - Remaining Pressure)/14.7; difference between pressure gas and gas remaining

[6]fraction of VOC gas remains in car; however, for worst case, it is assumed all VOC in railcar is released to flare

[7]Vapor molecular weight of 117 indicates compounds similar in vapor pressure to octane (MW = 114) are present in vapor. Therefore, heating value 6,249 btu/scf is used to provide a conservative estimate of the heat value of the biodiesel vapors.

Table A-12. Flaing Emission Factors

	NOx[1] (lb/MMBtu)	CO[1] (lb/MMBtu)
Emission Factors[1]	0.0485	0.3503

[1]RG-109 NOx, CO emission factors for high BTU gases, steam assist

Table A-13. Flaing Emissions

	NOx	CO	VOCs
# of Rail cars per hour	1.0	1.0	1.0
Total Railcars per year	168	168	168
Hourly Emissions (lb/hr)	3.09E-05	2.23E-04	1.39E-03
Annual Emissions (tpy)	2.60E-06	1.88E-05	1.17E-04

Sample Calculations:

Short-Term NOx Emission Rate:

$$\frac{1.0\ \text{railcars}}{\text{hour}} \left| \frac{0.049\ \text{lb}}{\text{MMBtu}} \right| \frac{1.41\text{E-03 MMBtu}}{\text{Railcar}} = \frac{3.09\text{E-05 lb}}{\text{hr}}$$

Long-Term NOx Emission Rate:

$$\frac{0.049\ \text{lb}}{\text{MMBtu}} \left| \frac{0.00\ \text{MMBtu}}{\text{railcar}} \right| \frac{168\ \text{cars}}{\text{yr}} \left| \frac{\text{ton}}{2000\ \text{lb}} \right. = \frac{2.60\text{E-06 ton}}{\text{yr}}$$

Short-Term VOC Emission Rate:

$$\frac{1.0\ \text{railcars}}{\text{hour}} \ \frac{0.23\ \text{scf}}{\text{car}} \left| \frac{\text{lb-mole}}{379.41\ \text{scf}} \right| \frac{117\ \text{lb}}{\text{lb-mole}} \left| \frac{0.02\ \text{lb unburned}}{\text{lb flared}} \right. = \frac{1.39\text{E-03 lb}}{\text{hr}}$$

Long-Term VOC Emission Rate:

$$\frac{0.23\ \text{scf}}{\text{car}} \left| \frac{\text{lb-mole}}{379.41\ \text{scf}} \right| \frac{117\ \text{lb}}{\text{lb-mole}} \left| \frac{168\ \text{cars}}{\text{yr}} \right| \frac{\text{ton}}{2000\ \text{lb}} \left| \frac{0.02\ \text{lb unburned}}{\text{lb flared}} \right. = \frac{1.2\text{E-04 ton}}{\text{yr}}$$

Table A-14 Net Component Count by Unit / Type [1,2,3,4]

Unit	Valves	Pumps[2]	Heavy Liquid PRV[4] (Pressure Relief Valves)	Water Sealed Drains	Connectors[3]
Rail Rack	37	2	0	3	46

[1] Based on component information provided by Ed Riege phone call

[2] Includes agitators. Per EPA Protocol For Equipment Leak Emission Estimates, Table 2-2, footnote c, agitator emissions may be estimated using light liquid service pump factors.

[3] The emission factors for flanges and connectors are the same for all services. The values shown in the "Emission Factors" sheet are used to calculate the emission rates.

[4] All pressure relief valves are vented to the flare and are not included in either the component counts or in the emission rates.

Table A-15 Net VOC Emission by Unit / Service / Component, lbs/hr [1,2]

Unit	Valves	Pumps	Heavy Liquid PRV (Pressure Relief Valves)	Water Sealed Drains	Connectors
Rail Rack	**0.039**	**0.096**	**0**	**0.11**	**0.025**

[1] Based on component information provided by Ed Riege phone call

[2] The values shown in the "Emission Factors" sheet are used to calculate the emission rates.

Table A-16 Net VOC Fugitive Emissions

Source	VOC Fugitive Emissions (lb/hr)	(tpy)
Rail Rack Crude Loading	0.26	1.16
Total with 50% Safety Factor[1]	**0.40**	**1.74**

[1]To allow for extra as-build components

Table A-17 Fugitive Component Emission Factors

Component Type	Service	Normal[3] Leak Rate (kg/hr/source)	Normal Leak Rate (lb/hr/source)	Leaky[3] Leak Rate (kg/hr/source)	Leaky Leak Rate (lb/hr/source)	Emission Factor Source
Valve[1]	Heavy Liquid	0.00024	0.00052	0.01230	0.02706	EPA Protocol For Equipment Leak Emission Estimates, Table 2-10
Pumps[2]	Heavy Liquid	0.02100	0.04620	0.05644	0.12416	EPA Protocol For Equipment Leak Emission Estimates, Table 2-10
Process Drains	Heavy Liquid	0.01591	0.03500	-	-	AP-42, 4th Ed., Table 9.1-2 for uncontrolled drains 50% Control applied for water sealed drains per EPA-450/3-85-001a (02/85)
Connectors	Heavy Liquid	0.00025	0.00055	-	-	EPA Protocol For Equipment Leak Emission Estimates, Table 2-2

	Normal	Leaky	
[1] Valve Screening Level	500	100,000	ppm
[2] Pump Screening Level	2,000	100,000	ppm
[3] Percentage of Components	98%	2%	

Table A-19 Liquid Loading Losses [1, 2, 3, 4]

Source ID	Material Transferred	Vapor Molecular Weight (lb/lb-mole)	True Vapor Pressure (psia)	Saturation Factor [1]	Average Temperature (°R)	Loading Loss [2,3] ($lb/10^3$ gal)	Control Efficiency [4] (%)	Collection Efficiency (%)	Annual Throughput (bbl/yr)	Total Annual Emissions (tpy)
Truck Rack	Blended Diesel/Biodiesel	130	0.0074	1.00	520	0.023	0%	0.0%	2,299,500	1.11
							Total Liquid Loading Emissions from Truck Rack			1.11

[1] Per U.S. EPA AP-42 Section 5.2 Transportation And Marketing Of Petroleum Liquids, Table 5.2-1.
[2] Per MACT CC operation of the Vapor Recovery Unit (VRU) at the Truck Loading Rack should limit VOC emissions to 10 mg of VOC / liter (0.083 $lb/10^3$ gal) of gasoline loaded.
[3] Per methodology described in U.S. EPA AP-42 Section 5.2 Transportation And Marketing Of Petroleum Liquids.
[4] Per U.S. EPA AP-42 Section 5.2 Transportation And Marketing Of Petroleum Liquids.
Vapor recovery efficiency is assumed to be 95%
Vapor collection efficiency (MACT CC requirement) is assumed to be 99.2%

Sample Calculation

Loading Loss:	12.46	130 lb / lb-mole	0.01 psia	1.00	/ 519.6 °R	=	0.02 lb / 10^3 gal
Annual Emissions:	0.02 lb / 1,000 gal	2,299,500 bbl / yr	42 gal / bbl	100% - 00.00%	ton / 2,000 lbs	=	1.11 ton / yr

Table A-20 Unloading Losses for Liquids and Gases at Truck Rack and Rail Rack

Source ID	Material Transferred	Loading or Unloading	Loading Arm Diameter (in)	Soft Hose Length (ft)	Loading Arm Pipe Length (ft)	Loading Arm Overpressure (psig)	Depressurived Volume[1] (ft^3/truck or railcar)	Gas Molecular Weight (lb/lb-mole)	True Vapor Pressure (psia)	Annual Throughput (bbl/yr)	Unloading Emissions (lb/railcar)	Hourly VOC Emissions[2] (lb/hr)	Annual VOC Emissions[3] (tpy)
Rail Rack	Biodiesel	Unloading	4	6	10	1	0.62	117	5.90E-03	109,500	7.54E-05	7.54E-05	5.58E-06
										Total Fugitive Emissions from Rail Rack		7.54E-05	5.58E-06

[1] The hose will be capped as soon as it is disconnected from the railcar. It is assumed, all of the vapor from the soft hose is released (worst case emissions) and all of the vapor from the pipe above atmospheric pressure (14.7 psia) or gauge pressure (1 psig)
[2] It is assumed that the truck rack can unload 6 trucks per hour and the rail rack can unload 1 railcars per hour.
[3] Annual emissions are based on the annual throughput and the number of trucks and railcars necessary to deliver the annual amount of material. The number of trucks and railcars is based on the capcaity of each (i.e., 8,000 gallons and 660 barrels, respectively)

Sample Calculation

Depressurized Volume:	8.73E-02 square ft	6 ft	(1 psig + 14.7 psia) / 14.7 psia	+	10 ft	1 psig / 14.7 psia	=	0.62 cubic ft / railcar
Unloading Emissions:	0.62 cubic ft / railcar	lb-mol / 385.4 cubic ft	117 lb / lb-mol	5.90E-03 psia	/ 14.7 psia	=	7.54E-05 lb / railcar	
Hourly Emissions	7.54E-05 lb / railcar	1.5 railcar / hr	=	7.54E-05 lb / hr				
Annual Emission:	7.54E-05 lb / railcar	109,500 bbl / yr	railcar / 740 bbl	ton / 2000 lb	=	5.58E-06 ton / yr		

Table A-21 Vapor Phase HAP Speciation

Source ID	Material Transferred	HAPs Defined in Section 112 (b) of Clean Air Act									TAPs Listed in 20.2.72.502 NMAC	
		Trimethylpentane (ppmw)	Benzene (ppmw)	Cumene (ppmw)	Ethylbenzene (ppmw)	n-Hexane (ppmw)	Naphthalene (ppmw)	PAC (ppmw)	Toluene (ppmw)	Xylene (ppmw)	1,2,4-Trimethylbenzene (ppmw)	Cyclohexane (ppmw)
Truck Rack	Blended Diesel/Biodiesel	100	0	100	200	0	1,800	50	600	2,100	3,900	400
Rail Rack	Biodiesel	80	0	80	160	0	1,440	40	480	1,680	3,120	320

Table A-22 Annual HAP Emissions from Loading Racks

Source ID	Material Transferred	HAPs Defined in Section 112 (b) of Clean Air Act									
		2,2,4-Trimethylpentane (tpy)	Benzene (tpy)	Cumene (tpy)	Ethylbenzene (tpy)	n-Hexane (tpy)	Naphthalene (tpy)	PAC (tpy)	Toluene (tpy)	Xylene (tpy)	Total HAPs (tpy)
Truck Rack	Blended Diesel/Biodiesel	1.11E-04	0.00E+00	1.11E-04	2.23E-04	0.00E+00	2.01E-03	5.57E-05	6.68E-04	2.34E-03	5.51E-03
Rail Rack	Biodiesel	4.46E-10	0.00E+00	4.46E-10	8.92E-10	0.00E+00	8.03E-09	2.23E-10	2.68E-09	9.37E-09	2.21E-08
Truck Rack	***Total***	***1.11E-04***	***0.00E+00***	***1.11E-04***	***2.23E-04***	***0.00E+00***	***2.01E-03***	***5.57E-05***	***6.68E-04***	***2.34E-03***	***5.51E-03***
Rail Rack	***Total***	***4.46E-10***	***0.00E+00***	***4.46E-10***	***8.92E-10***	***0.00E+00***	***8.03E-09***	***2.23E-10***	***2.68E-09***	***9.37E-09***	***2.21E-08***

Sample Calculation - Assuming vapor is 100% VOCs

Annual Emissions:

$$\frac{5.58\text{E-06 ton VOC}}{\text{yr}} \left| \frac{1 \text{ ton Fuel Oil Vapor}}{1 \text{ ton VOC}} \right| \frac{0{,}040 \text{ ppmw PAC}}{\text{Vapor}} \left| \frac{1}{10^6 \text{ ppmw}} \right. = \frac{2.23\text{E-10 ton}}{\text{yr}}$$

Table A-23 Net VOC Fugitive Emissions

Source	VOC Fugitive Emissions (lb/hr)	(tpy)
Biodiesel Unloading, Storage, Loading	0.26	1.16
Total with 50% Safety Factor[1]	**0.40**	**1.74**

[1]To allow for extra as-build components

Table A-24 Representative Stream for Each Process Unit/Area

Unit	Material HAP Speciation Used	HAP Speciation Basis
Biodiesel Unloading, Stoarge, Loading	Biodiesel	Biodiesel

Table A-25 Representative Stream HAP Speciation[1]

Stream	HAPs Defined in Section 112 (b) of Clean Air Act: 2,2,4-Trimethylpentane (ppmw)	Benzene (ppmw)	Cumene (ppmw)	Ethylbenzene (ppmw)	n-Hexane (ppmw)	Naphthalene (ppmw)	PAC (ppmw)	Toluene (ppmw)	Xylene (ppmw)	Arsenic (ppmw)	Lead (ppmw)	Mercury (ppmw)	Nickel (ppmw)	TAPs Listed in 20.2.72.502 NMAC: 1,2,4-Trimethylbenzene (ppmw)	Ammonia (ppmw)	Cyclohexane (ppmw)	Copper (ppmw)	Vanadium (ppmw)
Biodiesel	80	0	80	160	0	1,440	40	480	1,680	0.00	0.12	0.0163	0.40	3,120	0.00	320	0.00	0.00

[1] Based on stream speciation provided by facility

Table A-26 Hourly HAP Emissions from Fugitives

Functional Unit	HAPs Defined in Section 112 (b) of Clean Air Act: 2,2,4-Trimethylpentane (lb/hr)	Benzene (lb/hr)	Cumene (lb/hr)	Ethylbenzene (lb/hr)	n-Hexane (lb/hr)	Naphthalene (lb/hr)	PAC (lb/hr)	Toluene (lb/hr)	Xylene (lb/hr)	Arsenic (lb/hr)	Lead (lb/hr)	Mercury (lb/hr)	Nickel (lb/hr)	TAPs Listed in 20.2.72.502 NMAC: 1,2,4-Trimethylbenzene (lb/hr)	Ammonia (ppmw)	Cyclohexane (lb/hr)	Copper (lb/hr)	Vanadium (lb/hr)	Total HAP Emissions (lb/hr)
Biodiesel Unloading, Storage, Loading	3.18E-05	0.00E+00	3.18E-05	6.35E-05	0.00E+00	5.72E-04	1.59E-05	1.91E-04	6.67E-04	0.00E+00	4.76E-08	6.47E-09	1.59E-07	0.00	0.00	0.00	0.00	0.00	***1.57E-03***

Sample Calculation - 2,2,4-TMP (Assuming vapor emitted is 100% VOCs and crude vapor phase speciation equals liquid phase speciation.)

Hourly Emissions:

$$\frac{0.40\text{ lb VOC}}{\text{hr}} \left| \frac{\text{lb vapor}}{\text{lb VOC emitted}} \right| \frac{80\text{ ppmw benzene}}{\text{Crude}} \left| \frac{1}{10^6\text{ ppmw}} \right. = \frac{3.18\text{E-05 lb}}{\text{hr}}$$

Table A-28 Annual HAP Emissions from Fugitives

Functional Unit	HAPs Defined in Section 112 (b) of Clean Air Act: 2,2,4-Trimethylpentane (tpy)	Benzene (tpy)	Cumene (tpy)	Ethylbenzene (tpy)	n-Hexane (tpy)	Naphthalene (tpy)	PAC (tpy)	Toluene (tpy)	Xylene (tpy)	Arsenic (tpy)	Lead (tpy)	Mercury (tpy)	Nickel (tpy)	Total HAP Emissions (tpy)
Biodiesel Unloading, Storage, Loading	1.39E-04	0.00E+00	1.39E-04	2.78E-04	0.00E+00	2.50E-03	6.96E-05	8.35E-04	2.92E-03	0.00E+00	2.09E-07	2.83E-08	6.96E-07	***0.01***

Sample Calculation - Benzene (Assuming vapor emitted is 100% VOCs and vapor phase speciation equals liquid phase speciation.)

Annual Emissions:

$$\frac{1.74\text{ ton VOC}}{\text{yr}} \left| \frac{\text{ton vapor}}{\text{ton VOC emitted}} \right| \frac{80\text{ ppmw benzene}}{\text{Crude}} \left| \frac{1}{10^6\text{ ppmw}} \right. = \frac{0.0000\text{ ton}}{\text{yr}}$$

Table A-29 Materials Transferred at a Truck Rack[1]

Material Transferred	Material Type	Loading or Unloading	Control Device
Gasoline	Liquid	Loading	None
Blended Diesel/Biodiesel	Liquid	Loading	None
Crude	Liquid	Unloading	None
Ethanol	Liquid	Both	None
Fuel Oil	Liquid	Both	
Propane	Gas	Both	
Butane	Gas	Both	
Slop Oil	Liquid	Unloading	
Chevron Additive	Liquid	Unloading	
Western Additive	Liquid	Unloading	
Exxon Mobil Additive	Liquid	Unloading	
Conoco Additive	Liquid	Unloading	
Shell Additive	Liquid	Unloading	
Recovered Oil/Trans Mix	Liquid	Unloading	
Sweet Naphtha	Liquid	Unloading	
Sour Naphtha	Liquid	Unloading	

Table A-30 Materials Transferred at a Rail Rack

Material Transferred	Material Type	Loading or Unloading	Control Device
Ammonium thiosulfate	Liquid	Loading	None
Naphtha	Liquid	Loading	None
Crude	Liquid	Both	None
Fuel Oil	Liquid	Both	None
Butane	Gas	Both	None
Isobutane	Gas	Both	None
Propane	Gas	Both	None
Olefins	Gas	Both	None
Ethanol	Liquid	Unloading	None
Toluene	Liquid	Unloading	None
Diesel	Liquid	Unloading	None
Biodiesel	Liquid	Unloading	None

Table A-31 Uncontrolled Liquid Loading Losses[1,2,3,4]

Source ID	Material Transferred	Vapor Molecular (lb/lb-mole)	True Vapor (psia)	Saturation Factor	Average Temperature (°R)	Loading Loss [2] (lb/10^3 gal)	Control Device	Control (%)	Collection (%)	Annual (bbl/yr)	Annual (tpy)
Fuel Oil Rack	Fuel Oil	365	6.00E-04	1.45	512	0.008				80,758	1.31E-02
Truck Rack	Gasoline	67	7.47	1.45	512	17.66	None	0.0%	0.0%	7,336,500	2.72E+03
Truck Rack	Blended Diesel/Biodiesel	130	0.007	1.00	520	0.023	None	0.0%	0.0%	2,044,001	9.90E-01
Truck Rack	Ethanol	46.1	0.75	1.45	512	1.22	None	0.0%	0.0%	83,950	2.14E+00
Rail Rack	Crude	60	4.55	0.60	520	3.93	None	0%	0.0%	2,230,800	1.84E+02
Rail Rack	Naphtha	75	0.97	1.00	540	1.673	None	0%	0.0%	180,000	6.32E+00
Rail Rack	Fuel Oil	365	6.00E-04	1.45	512	0.008	None	0%	0.0%	50,642	8.22E-03
Rail Rack	Ammonium Thiosulfate	42.3	0.51	1.45	512	0.76	None	0%	0.0%	11,071	1.76E-01
										Total Liquid Loading Emissions from Truck Rack	2723.91
										Total Liquid Loading Emissions from Rail Rack	190.71

[a] Vapor Molecular Weight, True Vapor Pressure and Average Temperature acquired from TANKS database for 2007 Title V Renewal Application for Gallup Refinery.

[b] Annual throughput obtained from either 2007 NSR application or *Gallup TRI 2007 - facility provided.xls* ("Thruput" tab).

[1] Per U.S. EPA AP-42 Section 5.2 Transportation And Marketing Of Petroleum Liquids, Table 5.2-1.

[2] Per methodology described in U.S. EPA AP-42 Section 5.2 Transportation And Marketing Of Petroleum Liquids.

Sample Calculation - Diesel (Truck Rack)

Loading Loss:

$$\frac{12.46}{} \times \frac{130\ \text{lb}}{\text{lb-mole}} \times \frac{0.01\ \text{psia}}{} \times \frac{1.00}{} \times \frac{}{512\ °\text{R}} = \frac{2.31\text{E-02 lb}}{10^3\ \text{gal}}$$

Annual Uncaptured Emissions:

$$\frac{0.023\ \text{lb}}{1{,}000\ \text{gal}} \times \frac{2{,}044{,}001\ \text{bbl}}{\text{yr}} \times \frac{42\ \text{gal}}{\text{bbl}} \times \frac{100\% - 00.0\%}{} \times \frac{\text{ton}}{2{,}000\ \text{lbs}} = \frac{0.99\ \text{ton}}{\text{yr}}$$

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Table A-32 Uncontrolled Liquid Unloading Losses and Gas Loading/Unloading (Hose Disconnect Fugitive Emissions)

Source ID	Material Transferred	Loading or Unloading	Loading Arm Diameter (in)	Soft Hose Length (ft)	Loading Arm Pipe Length (ft)	Loading Arm Overpressure (psig)	Depressurived Volume[1] (ft^3/truck or railcar)	Gas Molecular Weight (lb/lb-mole)	True Vapor Pressure (psia)	Annual Throughput (bbl/yr)	Fugitive Emissions (lb/truck or railcar)	Annual VOC Emissions[2] (tpy)
Truck Rack	Propane	Both	4	6	10	1	0.62	44.1	188	104,342	0.91	0.25
Truck Rack	Butane	Both	4	6	10	1	0.62	58.12	52	78,745	0.33	6.74E-02
Truck Rack	Crude	Unloading	4	6	10	1	0.62	60	4.6	2,000	0.03	1.56E-04
Truck Rack	Ethanol	Unloading	4	6	10	1	0.62	46.1	0.75	91,621	3.76E-03	9.03E-04
Truck Rack	Fuel Oil	Unloading	4	6	10	1	0.62	365	6.00E-04	14,489	2.39E-05	9.07E-07
Truck Rack	Chevron Additive	Unloading	4	6	10	1	0.62	200	0.12	155	2.64E-03	1.07E-06
Truck Rack	Western Additive	Unloading	4	6	10	1	0.62	200	0.12	619	2.64E-03	4.28E-06
Truck Rack	Exxon Mobil Additive	Unloading	4	6	10	1	0.62	200	0.12	569	2.64E-03	3.94E-06
Truck Rack	Conoco Additive	Unloading	4	6	10	1	0.62	200	0.12	5	2.64E-03	3.29E-08
Truck Rack	Shell Additive	Unloading	4	6	10	1	0.62	200	0.12	62	2.64E-03	4.28E-07
Truck Rack	Recovered Oil/Trans Mix	Unloading	4	6	10	1	0.62	130	1.0	170,455	1.42E-02	6.33E-03
Truck Rack	Sweet Naphtha	Unloading	4	6	10	1	0.62	75	0.97	795,700	7.91E-03	1.65E-02
Truck Rack	Sour Naphtha	Unloading	4	6	10	1	0.62	75	0.97	795,700	7.91E-03	1.65E-02
Rail Rack	Butane	Both	4	6	10	1	0.62	58.1	52	5,205	0.33	1.15E-03
Rail Rack	Isobutane	Both	4	6	10	1	0.62	58.1	72	148,555	0.46	4.61E-02
Rail Rack	Propane	Both	4	6	10	1	0.62	44.1	188	2,238	0.91	1.37E-03
Rail Rack	Olefins	Both	4	6	10	1	0.62	130	1.0	65,000	1.42E-02	6.23E-04
Rail Rack	Fuel Oil	Unloading	4	6	10	1	0.62	365	6.00E-04	14,489	2.39E-05	2.34E-07
Rail Rack	Crude	Unloading	4	6	10	1	0.62	60	4.6	2,316,800	2.98E-02	0.05
Rail Rack	Ethanol	Unloading	4	6	10	1	0.62	46.1	0.75	83,950	3.76E-03	2.13E-04
Rail Rack	Biodiesel	Unloading	4	6	10	1	0.62	117	0.01	109,500	7.54E-05	5.58E-06
Rail Rack	Toluene	Unloading	4	6	10	1	0.62	92.1	0.25	14,235	2.53E-03	2.43E-05
Total Fugitive Emissions from Truck Rack												0.36
Total Fugitive Emissions from Rail Rack												0.10

[a] Vapor Molecular Weight, True Vapor Pressure and Average Temperature acquired from TANKS database for 2007 Title V Renewal Application for Gallup Refinery.

[1] The hose will be capped as soon as it is disconnected from the truck or railcar. It is assumed, all of the vapor from the soft hose is released (worst case emissions) and all of the vapor from the pipe above atmospheric pressure (14.7 psia) or gauge pressure

The vapor area released is calculated by taking the volume of the hose and piping multiplied by the pressure fraction released. The entire volume of the hose is assumed to be released, but only the presssure above atmospheric or gauge pressure of the pipe

Ex. (Diameter^2 x Pi ÷ 4) x [Hose length x (psia ÷ 14.7 psi) + Pipe length x (psig ÷ 14.7 psi)]

[2] Annual emissions are based on the annual throughput and the number of trucks and railcars necessary to deliver the annual amount of material. The number of trucks and railcars is based on the capcaity of each (i.e., 8,000 gallons and 740 barrels, respectively)

Sample Calculation - Rail Rack, Crude

Depressurized Volume:

$$\frac{8.73\text{E-02 square ft}}{} \left| \frac{6\text{ ft}}{} \right| \frac{(1\text{ psig} + 14.7\text{ psia})}{14.7\text{ psia}} + \frac{10\text{ ft}}{} \left| \frac{1\text{ psig}}{14.7\text{ psia}} \right. = \frac{0.62\text{ cubic ft}}{\text{railcar}}$$

Unloading Emissions:

$$\frac{0.62\text{ cubic ft}}{\text{railcar}} \left| \frac{\text{lb-mol}}{385.4\text{ cubic ft}} \right| \frac{60\text{ lb}}{\text{lb-mol}} \left| \frac{4.55\text{ psia}}{} \right| \frac{}{14.7\text{ psia}} = \frac{2.98\text{E-02 lb}}{\text{railcar}}$$

Annual Emission:

$$\frac{2.98\text{E-02 lb}}{\text{railcar}} \left| \frac{2{,}316{,}800\text{ bbl}}{\text{yr}} \right| \frac{\text{railcar}}{740\text{ bbl}} \left| \frac{\text{ton}}{2000\text{ lb}} \right. = \frac{0.05\text{ ton}}{\text{yr}}$$

Table A33 Materials Transferred at a Truck Rack[1]

Material Transferred	Material Type	Loading or Unloading	Control Device
Gasoline	Liquid	Loading	VRU
Blended Diesel/Biodiesel	Liquid	Loading	VRU
Crude	Liquid	Unloading	None
Ethanol	Liquid	Both	VRU/None
Fuel Oil	Liquid	Both	
Propane	Gas	Both	
Butane	Gas	Both	
Slop Oil	Liquid	Unloading	
Chevron Additive	Liquid	Unloading	
Western Additive	Liquid	Unloading	
Exxon Mobil Additive	Liquid	Unloading	
Conoco Additive	Liquid	Unloading	
Shell Additive	Liquid	Unloading	
Recovered Oil/Trans Mix	Liquid	Unloading	
Sweet Naphtha	Liquid	Unloading	
Sour Naphtha	Liquid	Unloading	

Table A34 Materials Transferred at a Rail Rack

Material Transferred	Material Type	Loading or Unloading	Control Device
Ammonium thiosulfate	Liquid	Loading	Flare
Naphtha	Liquid	Loading	Flare
Crude	Liquid	Both	Flare
Fuel Oil	Liquid	Both	Flare
Butane	Gas	Both	Flare
Isobutane	Gas	Both	Flare
Propane	Gas	Both	Flare
Olefins	Gas	Both	Flare
Ethanol	Liquid	Unloading	Flare
Toluene	Liquid	Unloading	Flare
Diesel	Liquid	Unloading	Flare
Biodiesel	Liquid	Unloading	None

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Table A35 Liquid Loading Losses[1,2,3,4]

Source ID	Material Transferred	Vapor Molecular Weight (lb/lb-mole)	True Vapor Pressure (psia)	Saturation Factor [1]	Average Temperature (°R)	Loading Loss [2,3] ($lb/10^3$ gal)	Control Device	Control Efficiency [4] (%)	Collection Efficiency (%)	Hourly Throughput (bbl/hr)	Annual Throughput (bbl/yr)	Controlled Loading Emissions (lb/hr)	Uncaptured Emissions (lb/hr)	Controlled Loading Emissions (tpy)	Annual Uncaptured Emissions (tpy)	Total Hourly Loading Emissions (lb/hr)	Total Annual Loading Emissions (tpy)
Fuel Oil Rack	Fuel Oil	365	6.00E-04	1.45	512	0.008	-	-	-	191	80,758	0	6.20E-02	0	1.31E-02	6.20E-02	1.31E-02
Truck Rack	Gasoline	67	7.47	1.45	512	0.083	VRU	94.2%	99.2%	191	7,336,500	6.66E-01	1.13	12.79	21.77	1.80E+00	34.55
Truck Rack	Blended Diesel/Biodiesel	130	0.007	1.00	520	0.023	-	-	-	350	2,299,500	0	3.39E-01	0	1.11E+00	3.39E-01	1.11
Truck Rack	Ethanol	46.1	0.75	1.45	512	1.22	VRU	94.2%	99.2%	191	83,950	5.62E-01	7.80E-02	0.12	1.72E-02	6.40E-01	0.14
Rail Rack	Crude	60	4.6	0.60	520	3.932	Flare	98%	99.2%	660	2,230,800	2.18	0.87	3.68	1.47	3.05	5.16
Rail Rack	Naphtha	75	0.97	1.00	540	1.673	Flare	98%	99.2%	660	180,000	9.27E-01	3.71E-01	1.26E-01	5.06E-02	1.30	1.77E-01
Rail Rack	Fuel Oil	365	6.00E-04	1.45	610	0.006	Flare	98%	99.2%	660	50,642	3.60E-03	1.44E-03	1.38E-04	5.52E-05	5.03E-03	1.93E-04
Rail Rack	Ammonium Thiosulfate	42.3	0.51	1.45	512	0.76	Flare	98%	99.2%	660	11,071	4.19E-01	1.68E-01	3.52E-03	1.41E-03	5.87E-01	4.92E-03
Total Liquid Loading Emissions from Truck Rack														12.91	22.91	2.84	35.82
Total Liquid Loading Emissions from Rail Rack														To Flare	1.53	1.41	1.526

[a] Vapor Molecular Weight, True Vapor Pressure and Average Temperature acquired from TANKS database for 2009 NSR Application for Gallup Refinery. For naphtha and crude, vapor pressure calculated using AP-42 TVP calculation, which uses TANKS RVP value and average temperature as input variables.

[b] Annual throughput obtained from either 2009 NSR application or *Gallup TRI 2007 - facility provided.xls* ("Thruput" tab).

[1] Per U.S. EPA AP-42 Section 5.2 Transportation And Marketing Of Petroleum Liquids, Table 5.2-1. For crude and naphtha, selected the highest non-splash loading emission factor from Table 5.2-1. For all others, selected highest splash loading emission factor from Table 5.2-1.

[2] Per MACT CC, operation of the Vapor Recovery Unit (VRU) at the Truck Loading Rack should limit VOC emissions to 10 mg of VOC / liter ($0.083\ lb/10^3$ gal) of gasoline loaded.

[3] Per methodology described in U.S. EPA AP-42 Section 5.2 Transportation And Marketing Of Petroleum Liquids.

[4] Per U.S. EPA AP-42 Section 5.2 Transportation And Marketing Of Petroleum Liquids.

Vapor recovery efficiency is assumed to be 95%

Vapor collection efficiency (MACT CC requirement) is assumed to be 99.2%

Sample Calculation - Diesel (Truck Rack)

Loading Loss: $\frac{12.46}{} \times \frac{130\ lb}{lb\text{-}mole} \times \frac{0.01\ psia}{} \times \frac{1.00}{} \times \frac{}{512\ °R} = \frac{2.31E\text{-}02\ lb}{10^3\ gal}$

Annual Controlled Emissions: $\frac{0.023\ lb}{1{,}000\ gal} \times \frac{2{,}299{,}500\ bbl}{yr} \times \frac{42\ gal}{bbl} \times \frac{100\% - 94.24\%}{} \times \frac{ton}{2{,}000\ lbs} = \frac{0.00\ ton}{yr}$

Annual Uncaptured Emissions: $\frac{0.023\ lb}{1{,}000\ gal} \times \frac{2{,}299{,}500\ bbl}{yr} \times \frac{42\ gal}{bbl} \times \frac{100\% - 99.2\%}{} \times \frac{ton}{2{,}000\ lbs} = \frac{1.11\ ton}{yr}$

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Table A36 Liquid Unloading Losses and Gas Loading/Unloading (Hose Disconnect Fugitive Emissions)

Source ID	Material Transferred	Loading or Unloading	Loading Arm Diameter (in)	Soft Hose Length (ft)	Loading Arm Pipe Length (ft)	Loading Arm Overpressure (psig)	Depressurived Volume[1] (ft^3/truck or railcar)	Gas Molecular Weight (lb/lb-mole)	True Vapor Pressure (psia)	Annual Throughput (bbl/yr)	Fugitive Emissions (lb/truck or railcar)	Annual VOC Emissions[2] (tpy)
Truck Rack	Propane	Both	4	6	10	1	0.62	44.1	188	104,342	0.91	0.25
Truck Rack	Butane	Both	4	6	10	1	0.62	58.12	52	78,745	0.33	6.74E-02
Truck Rack	Crude	Unloading	4	6	10	1	0.62	60	4.6	2,000	0.03	1.56E-04
Truck Rack	Ethanol	Unloading	4	6	10	1	0.62	46.1	0.75	91,621	0.00	9.03E-04
Truck Rack	Fuel Oil	Unloading	4	6	10	1	0.62	365	6.00E-04	14,489	2.39E-05	9.07E-07
Truck Rack	Chevron Additive	Unloading	4	6	10	1	0.62	200	0.12	155	2.64E-03	1.07E-06
Truck Rack	Western Additive	Unloading	4	6	10	1	0.62	200	0.12	619	2.64E-03	4.28E-06
Truck Rack	Exxon Mobil Additive	Unloading	4	6	10	1	0.62	200	0.12	569	2.64E-03	3.94E-06
Truck Rack	Conoco Additive	Unloading	4	6	10	1	0.62	200	0.12	5	2.64E-03	3.29E-08
Truck Rack	Shell Additive	Unloading	4	6	10	1	0.62	200	0.12	62	2.64E-03	4.28E-07
Truck Rack	Recovered Oil/Trans Mix	Unloading	4	6	10	1	0.62	130	1.0	170,455	1.42E-02	6.33E-03
Truck Rack	Sweet Naphtha	Unloading	4	6	10	1	0.62	75	0.97	795,700	7.91E-03	1.65E-02
Truck Rack	Sour Naphtha	Unloading	4	6	10	1	0.62	75	0.97	795,700	7.91E-03	1.65E-02
Rail Rack	Butane	Both	4	6	10	1	0.62	58.1	52	5,205	0.33	1.15E-03
Rail Rack	Isobutane	Both	4	6	10	1	0.62	58.1	72	148,555	0.46	4.61E-02
Rail Rack	Propane	Both	4	6	10	1	0.62	44.1	188	2,238	0.91	1.37E-03
Rail Rack	Olefins	Both	4	6	10	1	0.62	130	1.0	65,000	1.42E-02	6.23E-04
Rail Rack	Fuel Oil	Unloading	4	6	10	1	0.62	365	6.00E-04	14,489	2.39E-05	2.34E-07
Rail Rack	Crude	Unloading	4	6	10	1	0.62	60	4.6	2,316,800	2.98E-02	0.05
Rail Rack	Ethanol	Unloading	4	6	10	1	0.62	46.1	0.75	83,950	3.76E-03	2.13E-04
Rail Rack	Biodiesel	Unloading	4	6	10	1	0.62	117	0.01	109,500	7.54E-05	5.58E-06
Rail Rack	Toluene	Unloading	4	6	10	1	0.62	92.1	0.25	14,235	2.53E-03	2.43E-05
											Total Fugitive Emissions from Truck Rack	0.36
											Total Fugitive Emissions from Rail Rack	0.096

[a] Vapor Molecular Weight, True Vapor Pressure and Average Temperature acquired from TANKS database for 2009 NSR Application for Gallup Refinery.

[1] The hose will be capped as soon as it is disconnected from the truck or railcar. It is assumed, all of the vapor from the soft hose is released (worst case emissions) and all of the vapor from the pipe above atmospheric pressure (14.7 psia) or gauge pressure

The vapor area released is calculated by taking the volume of the hose and piping multiplied by the pressure fraction released. The entire volume of the hose is assumed to be released, but only the presssure above atmospheric or gauge pressure of the pipe

Ex. (Diameter^2 x Pi ÷ 4) x [Hose length x (psia ÷ 14.7 psi) + Pipe length x (psig ÷ 14.7 psi)]

[2] Annual emissions are based on the annual throughput and the number of trucks and railcars necessary to deliver the annual amount of material. The number of trucks and railcars is based on the capcaity of each (i.e., 8,000 gallons and 740 barrels, respectively)

Sample Calculation - Rail Rack, Crude

Depressurized Volume:

$$\frac{8.73\text{E-02 square ft}}{} \left| \frac{6\text{ ft}}{} \right| \frac{(1\text{ psig} + 14.7\text{ psia})}{14.7\text{ psia}} + \frac{10\text{ ft}}{} \left| \frac{1\text{ psig}}{14.7\text{ psia}} \right. = \frac{0.62\text{ cubic ft}}{\text{railcar}}$$

Unloading Emissions:

$$\frac{0.62\text{ cubic ft}}{\text{railcar}} \left| \frac{\text{lb-mol}}{385.4\text{ cubic ft}} \right| \frac{60\text{ lb}}{\text{lb-mol}} \left| \frac{4.55\text{ psia}}{} \right| \frac{}{14.7\text{ psia}} = \frac{2.98\text{E-02 lb}}{\text{railcar}}$$

Annual Emission:

$$\frac{2.98\text{E-02 lb}}{\text{railcar}} \left| \frac{2{,}316{,}800\text{ bbl}}{\text{yr}} \right| \frac{\text{railcar}}{740\text{ bbl}} \left| \frac{\text{ton}}{2000\text{ lb}} \right. = \frac{0.05\text{ ton}}{\text{yr}}$$

Table A37 Liquid Loading Losses [1, 2, 3, 4]

Source ID	Material Transferred	Vapor Molecular Weight (lb/lb-mole)	True Vapor Pressure (psia)	Saturation Factor [1]	Average Temperature (°R)	Loading Loss [2,3] (lb/10^3 gal)	Control Efficiency [4] (%)	Collection Efficiency (%)	Annual Throughput (bbl/yr)	Annual Controlled Emissions (tpy)	Annual Uncaptured Emissions (tpy)	Total Annual Emissions (tpy)
Truck Rack	Fuel Oil	365	6.00E-04	1.45	512	0.008	-	-	80,758	0	1.31E-02	1.31E-02
Truck Rack	Gasoline	67	7.47	1.45	512	0.083	94.24%	99.2%	7,336,500	12.79	21.77	34.55
Truck Rack	Blended Diesel/Biodiesel	130	0.007	1.00	520	0.023	-	-	2,299,500	0	1.11	1.11
Truck Rack	Ethanol	46.1	0.75	1.45	512	1.22	94.24%	99.2%	83,950	0.12	0.02	0.14
Rail Rack	Crude	60	4.6	0.60	520	3.93	98%	99.2%	2,230,800	3.68	1.47	5.16
Rail Rack	Naphtha	75	0.97	1.00	540	1.67	98%	99.2%	180,000	1.26E-01	5.06E-02	1.77E-01
Rail Rack	Fuel Oil	365	6.00E-04	1.45	610	0.01	98%	99.2%	50,642	1.38E-04	5.52E-05	1.93E-04
Rail Rack	Ammonium Thiosulfate	42.34	0.51	1.45	512	0.76	98%	99.2%	11,071	3.52E-03	1.41E-03	4.92E-03
Total Liquid Loading Emissions from Truck Rack										12.91	22.91	35.82
Total Liquid Loading Emissions from Rail Rack										3.81E+00	1.53E+00	5.34

[1] Per U.S. EPA AP-42 Section 5.2 Transportation And Marketing Of Petroleum Liquids, Table 5.2-1.

[2] Per MACT CC operation of the Vapor Recovery Unit (VRU) at the Truck Loading Rack should limit VOC emissions to 10 mg of VOC / liter (0.083 lb/10^3 gal) of gasoline loaded.

[3] Per methodology described in U.S. EPA AP-42 Section 5.2 Transportation And Marketing Of Petroleum Liquids.

[4] Per U.S. EPA AP-42 Section 5.2 Transportation And Marketing Of Petroleum Liquids.

Vapor recovery efficiency is assumed to be 95%

Vapor collection efficiency (MACT CC requirement) is assumed to be 99.2%

Sample Calculation - Gasoline (Truck Rack)

Loading Loss:

$$\frac{12.46}{} \left| \frac{67\ \text{lb}}{\text{lb-mole}} \right| \frac{7.47\ \text{psia}}{} \left| \frac{1.45}{} \right| \frac{}{512\ °\text{R}} = \frac{0.08\ \text{lb}}{10^3\ \text{gal}}$$

Annual Controlled Emissions:

$$\frac{0.08\ \text{lb}}{1{,}000\ \text{gal}} \left| \frac{7{,}336{,}500\ \text{bbl}}{\text{yr}} \right| \frac{42\ \text{gal}}{\text{bbl}} \left| \frac{100\% - 94.24\%}{} \right| \frac{\text{ton}}{2{,}000\ \text{lbs}} = \frac{12.79\ \text{ton}}{\text{yr}}$$

Annual Uncaptured Emissions:

$$\frac{0.08\ \text{lb}}{1{,}000\ \text{gal}} \left| \frac{7{,}336{,}500\ \text{bbl}}{\text{yr}} \right| \frac{42\ \text{gal}}{\text{bbl}} \left| \frac{100\% - 99.2\%}{} \right| \frac{\text{ton}}{2{,}000\ \text{lbs}} = \frac{21.77\ \text{ton}}{\text{yr}}$$

Table A38 Unloading Losses for Liquids and Gases at Truck Rack and Rail Rack

Source ID	Material Transferred	Loading or Unloading	Loading Arm Diameter (in)	Soft Hose Length (ft)	Loading Arm Pipe Length (ft)	Loading Arm Overpressure (psig)	Depressurived Volume[1] (ft^3/truck or railcar)	Gas Molecular Weight (lb/lb-mole)	True Vapor Pressure (psia)	Annual Throughput (bbl/yr)	Unloading Emissions (lb/railcar)	Hourly VOC Emissions[2] (lb/hr)	Annual VOC Emissions[3] (tpy)
Truck Rack	Propane	Both	4	6	10	1	0.62	44.1	188.00	104,342	0.91	5.43	0.25
Truck Rack	Butane	Both	4	6	10	1	0.62	58.12	51.54	78,745	0.33	1.96	6.74E-02
Truck Rack	Crude	Unloading	4	6	10	1	0.62	60	4.6	2,000	0.03	0.18	1.56E-04
Truck Rack	Ethanol	Unloading	4	6	10	1	0.62	46.1	0.75	91,621	3.76E-03	2.26E-02	9.03E-04
Truck Rack	Fuel Oil	Unloading	4	6	10	1	0.62	365	6.00E-04	14,489	2.39E-05	1.43E-04	9.07E-07
Truck Rack	Chevron Additive	Unloading	4	6	10	1	0.62	200	0.12	155	2.64E-03	1.59E-02	1.07E-06
Truck Rack	Western Additive	Unloading	4	6	10	1	0.62	200	0.12	619	2.64E-03	1.59E-02	4.28E-06
Truck Rack	Exxon Mobil Additive	Unloading	4	6	10	1	0.62	200	0.12	569	2.64E-03	1.59E-02	3.94E-06
Truck Rack	Conoco Additive	Unloading	4	6	10	1	0.62	200	0.12	5	2.64E-03	1.59E-02	3.29E-08
Truck Rack	Shell Additive	Unloading	4	6	10	1	0.62	200	0.12	62	2.64E-03	1.59E-02	4.28E-07
Truck Rack	Recovered Oil/Trans Mix	Unloading	4	6	10	1	0.62	130	1.0	170,455	1.42E-02	8.52E-02	6.33E-03
Truck Rack	Sweet Naphtha	Unloading	4	6	10	1	0.62	75	0.97	795,700	7.91E-03	4.75E-02	1.65E-02
Truck Rack	Sour Naphtha	Unloading	4	6	10	1	0.62	75	0.97	795,700	7.91E-03	4.75E-02	1.65E-02
Rail Rack	Butane	Both	4	6	10	1	0.62	58.12	51.54	5,205	0.33	0.33	1.15E-03
Rail Rack	Isobutane	Both	4	6	10	1	0.62	58.12	72.39	148,555	0.46	0.46	4.61E-02
Rail Rack	Propane	Both	4	6	10	1	0.62	44.1	188.00	2,238	0.91	0.91	1.37E-03
Rail Rack	Olefins	Both	4	6	10	1	0.62	130	1.00	65,000	1.42E-02	1.42E-02	6.23E-04
Rail Rack	Fuel Oil	Unloading	4	6	10	1	0.62	365	6.00E-04	14,489	2.39E-05	2.39E-05	2.34E-07
Rail Rack	Crude	Unloading	4	6	10	1	0.62	60	4.6	2,316,800	2.98E-02	2.98E-02	0.05
Rail Rack	Ethanol	Unloading	4	6	10	1	0.62	46.1	0.75	83,950	3.76E-03	3.76E-03	2.13E-04
Rail Rack	Biodiesel	Unloading	4	6	10	1	0.62	117	0.01	109,500	7.54E-05	7.54E-05	6.35E-06
Rail Rack	Toluene	Unloading	4	6	10	1	0.62	92.14	0.25	14,235	2.53E-03	2.53E-03	2.43E-05
											Total Fugitive Emissions from Truck Rack		0.36
											Total Fugitive Emissions from Rail Rack		0.10

[1] The hose will be capped as soon as it is disconnected from the railcar. It is assumed, all of the vapor from the soft hose is released (worst case emissions) and all of the vapor from the pipe above atmospheric pressure (14.7 psia) or gauge pressure (1 psig)

[2] It is assumed that the truck rack can unload 6 trucks per hour and the rail rack can unload 1 railcars per hour.

[3] Annual emissions are based on the annual throughput and the number of trucks and railcars necessary to deliver the annual amount of material. The number of trucks and railcars is based on the capcaity of each (i.e., 8,000 gallons and 740 barrels, respectively)

Sample Calculation - Rail Rack, Crude

Depressurized Volume:

$$\frac{8.73E\text{-}02 \text{ square ft}}{} \bigg| \frac{6 \text{ ft}}{} \bigg| \frac{(1 \text{ psig} + 14.7 \text{ psia})}{14.7 \text{ psia}} + \frac{10 \text{ ft}}{} \bigg| \frac{1 \text{ psig}}{14.7 \text{ psia}} = \frac{0.62 \text{ cubic ft}}{\text{railcar}}$$

Unloading Emissions:

$$\frac{0.62 \text{ cubic ft}}{\text{railcar}} \bigg| \frac{\text{lb-mol}}{385.4 \text{ cubic ft}} \bigg| \frac{60 \text{ lb}}{\text{lb-mol}} \bigg| \frac{4.55 \text{ psia}}{} \bigg| \frac{}{14.7 \text{ psia}} = \frac{2.98E\text{-}02 \text{ lb}}{\text{railcar}}$$

Hourly Emissions

$$\frac{2.98E\text{-}02 \text{ lb}}{\text{railcar}} \bigg| \frac{1.5 \text{ railcar}}{\text{hr}} = \frac{2.98E\text{-}02 \text{ lb}}{\text{hr}}$$

Annual Emission:

$$\frac{2.98E\text{-}02 \text{ lb}}{\text{railcar}} \bigg| \frac{2{,}316{,}800 \text{ bbl}}{\text{yr}} \bigg| \frac{\text{railcar}}{740 \text{ bbl}} \bigg| \frac{\text{ton}}{2000 \text{ lb}} = \frac{0.05 \text{ ton}}{\text{yr}}$$

Table A39 Vapor Phase HAP Speciation

Source ID	Material Transferred	HAPs Defined in Section 112 (b) of Clean Air Act									TAPs Listed in 20.2.72.502 NMAC	
		Trimethylpentane (ppmw)	Benzene (ppmw)	Cumene (ppmw)	Ethylbenzene (ppmw)	n-Hexane (ppmw)	Naphthalene (ppmw)	PAC (ppmw)	Toluene (ppmw)	Xylene (ppmw)	1,2,4-Trimethylbenzene (ppmw)	Cyclohexane (ppmw)
Truck Rack	Propane	0	0	0	0	0	0	0	0	0	0	0
Truck Rack	Butane	0	300	0	0	1,400	0	0	100	0	0	700
Truck Rack	Crude	500	5,300	600	3,200	22,200	1,100	30	15,800	14,200	4,600	14,400
Truck Rack	Fuel Oil	0	0	0	0	0	100	12,000	0	0	0	0
Truck Rack	Gasoline	0	27,000	700	11,200	50,400	2,300	25	74,200	67,400	19,100	18,700
Truck Rack	Blended Diesel/Biodiesel	100	0	100	200	0	1,800	50	600	2,100	3,900	400
Truck Rack	Ethanol	0	700	100	300	2,100	0	0	1,900	1,500	700	1,100
Truck Rack	Chevron Additive			10,000						20,000		
Truck Rack	Western Additive		300	100	50,000				4,000	400,000		
Truck Rack	Exxon Mobil Additive									300,000		
Truck Rack	Conoco Additive				80,000					350,000		
Truck Rack	Shell Additive		500	100	100,000				2,000	500,000		
Truck Rack	Recovered Oil/Trans Mix	6,400	5,700	600	5,100	10,000	2,400	30	24,200	27,600	11,400	6,600
Truck Rack	Sweet Naphtha	400	7,300	1,700	8,300	29,500	40	0	44,300	44,100	9,500	32,000
Truck Rack	Sour Naphtha	400	7,300	1,700	8,300	29,500	40	0	44,300	44,100	9,500	32,000
Rail Rack	Butane	0	300	0	0	1,400	0	0	100	0	0	700
Rail Rack	Isobutane	0	0	0	0	0	0	0	0	0	0	0
Rail Rack	Propane	0	0	0	0	0	0	0	0	0	0	0
Rail Rack	Olefins	0	0	0	0	0	0	0	0	0	0	0
Rail Rack	Fuel Oil	0	0	0	0	0	100	12,000	0	0	0	0
Rail Rack	Crude	500	5,300	600	3,200	22,200	1,100	30	15,800	14,200	4,600	14,400
Rail Rack	Ethanol	0	700	100	300	2,100	0	0	1,900	1,500	700	1,100
Rail Rack	Biodiesel	0	560	80	240	1,680	0	0	1,520	1,200	560	880
Rail Rack	Toluene	0	0	0	0	0	0	0	1,000,000	0	0	0

Table A40 Annual HAP Emissions from Loading Racks

Source ID	Material Transferred	HAPs Defined in Section 112 (b) of Clean Air Act									
		2,2,4-Trimethylpentane (tpy)	Benzene (tpy)	Cumene (tpy)	Ethylbenzene (tpy)	n-Hexane (tpy)	Naphthalene (tpy)	PAC (tpy)	Toluene (tpy)	Xylene (tpy)	Total HAPs (tpy)
Truck Rack	Propane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Truck Rack	Butane	0.00E+00	2.02E-05	0.00E+00	0.00E+00	9.44E-05	0.00E+00	0.00E+00	6.74E-06	0.00E+00	1.21E-04
Truck Rack	Crude	7.81E-08	8.28E-07	9.37E-08	5.00E-07	3.47E-06	1.72E-07	4.69E-09	2.47E-06	2.22E-06	9.83E-06
Truck Rack	Fuel Oil	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.31E-06	1.57E-04	0.00E+00	0.00E+00	1.59E-04
Truck Rack	Gasoline	0.00E+00	0.93	2.42E-02	3.87E-01	1.74E+00	7.95E-02	8.64E-04	2.56E+00	2.33E+00	8.06E+00
Truck Rack	Blended Diesel/Biodiesel	1.11E-04	0.00E+00	1.11E-04	2.23E-04	0.00E+00	2.01E-03	5.57E-05	6.68E-04	2.34E-03	5.51E-03
Truck Rack	Ethanol	0.00E+00	9.91E-05	1.42E-05	4.25E-05	2.97E-04	0.00E+00	0.00E+00	2.69E-04	2.12E-04	9.34E-04
Truck Rack	Chevron Additive	0.00E+00	0.00E+00	1.07E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.14E-08	3.21E-08
Truck Rack	Western Additive	0.00E+00	1.28E-09	4.28E-10	2.14E-07	0.00E+00	0.00E+00	0.00E+00	1.71E-08	1.71E-06	1.95E-06
Truck Rack	Exxon Mobil Additive	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.18E-06	1.18E-06
Truck Rack	Conoco Additive	0.00E+00	0.00E+00	0.00E+00	2.64E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.15E-08	1.42E-08
Truck Rack	Shell Additive	0.00E+00	2.14E-10	4.28E-11	4.28E-08	0.00E+00	0.00E+00	0.00E+00	8.56E-10	2.14E-07	2.58E-07
Truck Rack	Recovered Oil/Trans Mix	4.05E-05	3.61E-05	3.80E-06	3.23E-05	6.33E-05	1.52E-05	1.90E-07	1.53E-04	1.75E-04	5.20E-04
Truck Rack	Sweet Naphtha	6.59E-06	1.20E-04	2.80E-05	1.37E-04	4.86E-04	6.59E-07	0.00E+00	7.30E-04	7.27E-04	2.23E-03
Truck Rack	Sour Naphtha	6.59E-06	1.20E-04	2.80E-05	1.37E-04	4.86E-04	6.59E-07	0.00E+00	7.30E-04	7.27E-04	2.23E-03
Rail Rack	Butane	0.00E+00	3.45E-07	0.00E+00	0.00E+00	1.61E-06	0.00E+00	0.00E+00	1.15E-07	0.00E+00	2.07E-06
Rail Rack	Isobutane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Rail Rack	Propane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Rail Rack	Olefins	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Rail Rack	Fuel Oil	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.93E-08	2.32E-06	0.00E+00	0.00E+00	2.34E-06
Rail Rack	Crude	2.60E-03	2.76E-02	3.12E-03	1.67E-02	1.16E-01	5.72E-03	1.56E-04	8.22E-02	7.39E-02	3.28E-01
Rail Rack	Ethanol	0.00E+00	1.49E-07	2.13E-08	6.40E-08	4.48E-07	0.00E+00	0.00E+00	4.06E-07	3.20E-07	1.41E-06
Rail Rack	Biodiesel	0.00E+00	3.56E-09	5.08E-10	1.52E-09	1.07E-08	0.00E+00	0.00E+00	9.65E-09	7.62E-09	3.35E-08

Rail Rack	Toluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.43E-05	0.00E+00	2.43E-05
Truck Rack	***Total***	***1.65E-04***	***9.33E-01***	***2.44E-02***	***3.88E-01***	***1.74E+00***	***8.15E-02***	***1.08E-03***	***2.57***	***2.33***	***8.07***
Rail Rack	***Total***	***2.60E-03***	***2.76E-02***	***3.12E-03***	***1.67E-02***	***1.16E-01***	***5.72E-03***	***1.58E-04***	***8.23E-02***	***7.39E-02***	***3.28E-01***

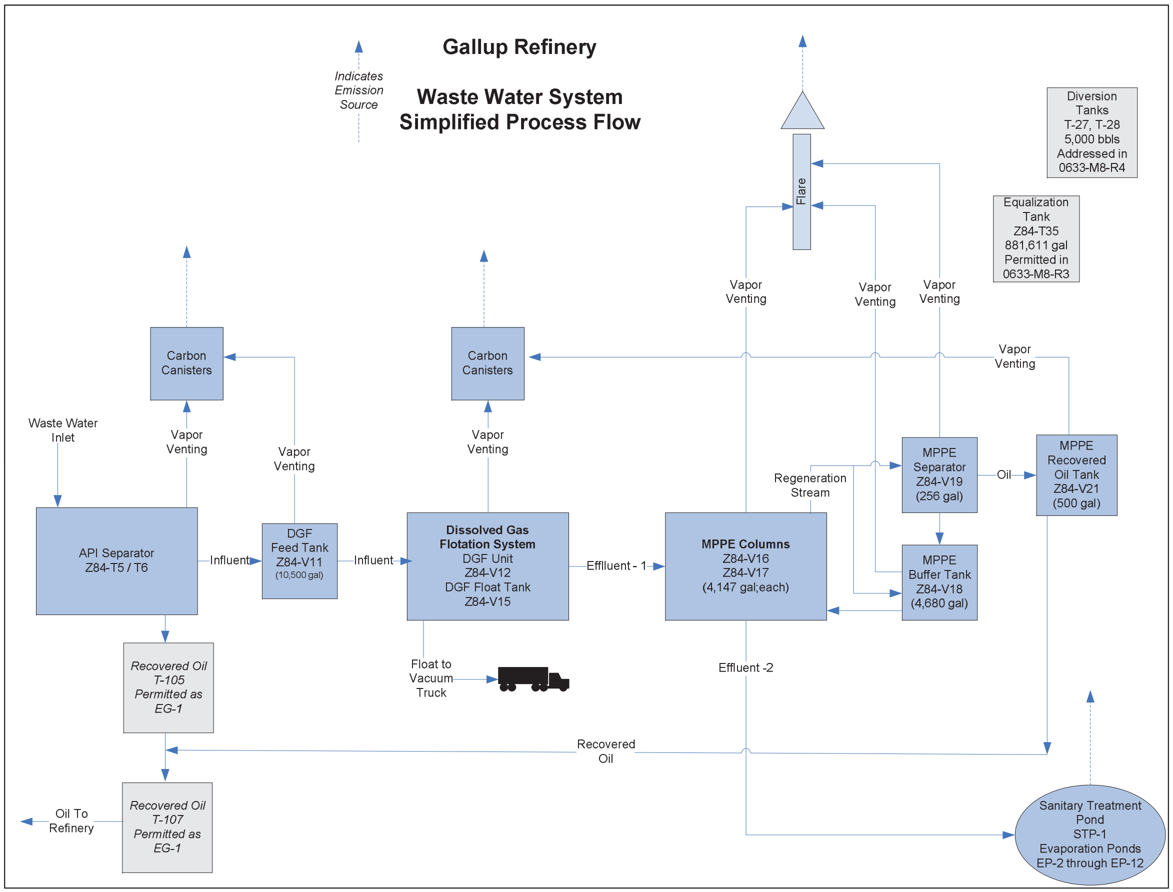
Sample Calculation - Benzene from Naphtha Unloading(Assuming naptha vapor is 100% VOCs)

Annual Emissions:

$$\frac{1.65\text{E-}02 \text{ ton VOC}}{\text{yr}} \times \frac{1 \text{ ton Naptha Vapor}}{1 \text{ ton VOC}} \times \frac{7{,}300 \text{ ppmw benzene}}{\text{Naptha Vapor}} \times \frac{1}{10^6 \text{ ppmw}} = \frac{1.20\text{E-}04 \text{ ton}}{\text{yr}}$$

Waste Water System Emissions

Unit Equipment	Waste Water System (WWS) that includes the following major equipment components: API Separator (NAPIS) Equilization tank (Z84-T35) - Permitted in 0633-M8-R3 Diversion tanks (T-27, T-28) - Permitted in 0633-M8-R4 DGF feed tank (Z84-V11) Dissolved Gas Flotation (DGF) Tank (Z84-V12) and DGF Float Tank (Z84-V15) Macro Porous Polymer Filter (MPPE) columns (Z84-V16, Z84-V17) MPPE Separator (Z84-V19) and Buffer tank (Z84-V18) MPPE Recovered Oil Tank (Z84-V21) TK-105 and TK-107 - Permitted as EG-1. Sanitary Treatment Pond and Lined, aeration impoundments (STP-1 and EP-2 through EP-12) Flaring of vapor streams from the MPPE columns and recovered oil tank.



Waste Water System Emissions

NAPIS	Mass flow	**DGF**		**MPPE**		**STP-1 and EP-2 through EP-12**
Process water	440 gal/min	500	Cannister outlet (ppmv)[2]	0.50	Benzene concentration to ponds (mg/L)[6]	1.0 Fraction evaporated
Process water	99935 L / hr	3531	Outbreathing (scf/hr)[3]	98.1%	Calculated MPPE Benzene Reduction Efficiency	
Cannister reduction	90% efficiency	100	Effluent-1 (ppmw)[4]			

	Influent Mass flow[1]		Effluent-1	Vapor[5]	Effluent-2[8]	Recovered Oil[6,7] Liquid	Recovered Oil[6,7] Vapor	Impoundment Evaporation		
	mg / l	lb / hr	mg/L	lb/hr	mg/L	lb/hr	lb/hr	lb/hr	tpy	
Benzene	26.00	5.73	26.00	0.39	0.50	5.62	0.0011	0.11	0.48	Benzene
Toluene	60.00	13.22	60.00	0.07	1.15	12.96	0.0007	0.25	1.11	Toluene
Ethylbenzene	5.60	1.23	5.60	0.01	0.11	1.21	0.00002	0.02	0.10	Ethylbenzene
Xylenes	34.00	7.49	34.00	0.04	0.65	7.35	0.0001	0.14	0.63	Xylenes
Other VOC	343.75	75.73	100.00	0.001	1.92	21.61	0.0005	0.42	1.86	Other VOC
Total VOC	469.35	103.41	225.60	0.53	4.34	48.75	0.00	0.96	4.19	Total VOC

1 BTEX and "Other VOC" estimate based on lab analyses from 2008-2010. "Other VOC "is the sum of hydrocarbon emissions and a safety factor of : 25%
BTEX concentrations are based on maximum detected values with a safety factor of: 100%
2 "No detectable emission" level as defined by §61.341. (NESAHP FF, Benzene Waste Operations). This level is applied to the "Total VOC" emissions; see Note 5 for calculation method.
3 Maximum outbreathing rate (DGF design specification).
4 Manufacturer's maximum specification for oil and grease removal (50 ppmw) with 100% safety factor. Applies only to "Other VOC".
BTEX is assumed to "pass through" to conservatively estimate downstream process emissions.
5 "Total VOC "Mass flow rate= Cannister outlet$_{ppmv}$ * standard molar outbreathing flowrate based on nitrogen ambient * MW $_{TotalVOC}$. The MW for "Total VOC" is conservatively assumed to be natural gasoline (MW= 114.332).
Individual species flow rates are based on the ratio of Influent-1 concentrations. Venting occurs from both the DGF and MPPE Recovered Oil Tank to a common cannister system.
6 Limit for hazardous solid waste.
7 Oil liquid is based on the difference between the mass flow rates from Effluent-1 and Effluent-2. Vapor emission based on TANKS 4.09d
8 Benzene concentration is set to the hazardous solid waste limit. Removal efficiency for other species is based on the "Calculated MMPE Reduction Efficiency" which is determined by the benzene reduction from Effluent-1 to Effluent-2.

VOC Emission Summary

	Benzene		Toluene		Ethylbenzene		Xylenes		Other VOC		Total VOC		Total VOC Emissions with a 20% safety factor	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
NAPIS[9]	0.029	0.13	0.067	0.30	0.006	0.03	0.038	0.17	0.387	1.69	0.53	2.31		
DGF Feed Tank[10]	0.076	0.335	0.047	0.204	0.001	0.005	0.005	0.023	0.117	0.511	0.25	1.08		
DGF Vapor	0.389	1.70	0.068	0.30	0.006	0.03	0.039	0.17	0.533	2.33	0.53	2.33		
MPPE Recovered Oil Vapor	0.001	0.005	0.001	0.003	0.15	0.00	0.0001	0.0005	0.00	0.00	0.00	0.01		
Net Fugitive Emissions	0.003	0.01	0.008	0.03	0.001	0.00	0.004	0.02	0.043	0.19	0.06	0.26		
Evaporation	0.11	0.48	0.25	1.11	0.02	0.10	0.14	0.63	0.42	1.86	0.96	4.19		
Total	**0.61**	**2.67**	**0.44**	**1.95**	**0.19**	**0.82**	**0.23**	**1.01**	**1.50**	**6.59**	**2.32**	**10.18**	**2.79**	**12.22**

9 AP-42 Table 5.1-2, Fugtive Emission Factors for Petroleum Refineries. Covered oil/water separator emission factor is 0.2 lb oil/1000 gal waste water.
Input to the NAPIS is estimated at 440 gpm. BTEX and Other/VOC emissions are based on ratio of the component to total VOC. Assumes conservative cannister reduction efficiency.
10 DGF Feed Tank emissions are based on TANKS 4.09d working and breathing losses and are controlled by the carbon cannisters common to the NAPIS.

Hall Environmental API Effluent -2010

		mg/l			mg/l
HC	Gasoline Organics	50000	Volatile	1-Methylnaphtalene	300
HC	Diesel Organics	200000	Volatile	2-Methylnaphtalene	500
HC	Motor Oil Organics	25000	Volatile	Acetone	9000
SV	Semi-Volatiles	24170	Volatile	2-Butanone	2000
Volatile	Benzene	2500	Volatile	n-Butylbenzene	90
Volatile	Toluene	7000	Volatile	n-Propylbenzene	115
Volatile	Ethylbenzene	700	Volatile	iso-Propylbenzene	75
Volatile	Xylenes	4200	Volatile	4-isopropyltoluene	30
Volatile	1,2,4-TMP	850	Volatile	sec-butylbenzene	210
Volatile	1,3,5-TMP	250	Volatile	MTBE	0
Volatile	Naphtalene	400			

Waste Water System: VOC Venting to the Flare and Consequent Emissions

VOC Venting to the Flare[1]

	Benzene		Toluene		Ethylbenzene		Xylenes		Other VOC		Total VOC	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
MPPE Separator	1.040	4.554	0.940	4.117	0.089	0.389	0.010	0.042	0.002	0.007	2.08	9.11
MPPE Buffer	0.850	3.724	0.426	1.867	0.097	0.423	0.661	2.894	1.036	4.539	3.07	13.45

Flare Emission Summary

	Mass flow	Specific Volume	Gross HV	Gross Heat Input	NOx^2		CO^2		VOC^3	
	(lb/hr)	(ft^3 / lb)	(Btu/ ft^3)	(MMBtu / hr)	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Benzene	3.08	4.858	3741.9	0.0560	0.008	0.034	0.015	0.068	0.038	0.166
Toluene	2.19	4.119	4474.8	0.0403	0.006	0.024	0.011	0.049	0.027	0.120
Ethylbenzene	0.56	3.574	5222.1	0.0104	0.001	0.006	0.003	0.013	0.004	0.016
Xylenes	1.09	3.574	5209.7	0.0204	0.003	0.012	0.006	0.025	0.013	0.059
Other VOC	3.66	5.260	6248.9	0.1202	0.017	0.073	0.033	0.145	0.021	0.091
					0.03	**0.15**	**0.07**	**0.30**	**0.10**	**0.45**

[1] No vapor emissions from the MPPE columns are assumed, based on design criteria. All regeneration streams are recovered in the separator/buffer.

[2] Flare emission factors are for "other" flare, high-Btu gas:

0.138 lb NOx / MMBtu

0.2755 lb CO / MMBtu.

[3] 98% Flare destruction efficiency

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Amoco
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Horizontal Tank
Description:	Amoco 6606

Tank Dimensions

Shell Length (ft):		5.00
Diameter (ft):		3.00
Volume (gallons):		150.00
Turnovers:		4.00
Net Throughput(gal/yr):		600.00
Is Tank Heated (y/n):	N	
Is Tank Underground (y/n):	N	

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Amoco - Horizontal Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Crude oil (RVP 5)	All	50.98	42.67	59.29	48.62	2.4032	2.0237	2.8381	50.0000			207.00	Option 4: RVP=5

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Amoco - Horizontal Tank
Gallup, NM

Annual Emission Calcaulations

Standing Losses (lb):	22.6754
Vapor Space Volume (cu ft):	22.5114
Vapor Density (lb/cu ft):	0.0219
Vapor Space Expansion Factor:	0.1499
Vented Vapor Saturation Factor:	0.8396
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	22.5114
Tank Diameter (ft):	3.0000
Effective Diameter (ft):	4.3713
Vapor Space Outage (ft):	1.5000
Tank Shell Length (ft):	5.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0219
Vapor Molecular Weight (lb/lb-mole):	50.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	2.4032
Daily Avg. Liquid Surface Temp. (deg. R):	510.6529
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	508.2900
Tank Paint Solar Absorptance (Shell):	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.1499
Daily Vapor Temperature Range (deg. R):	33.2462
Daily Vapor Pressure Range (psia):	0.8144
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	2.4032
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	2.0237
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	2.8381
Daily Avg. Liquid Surface Temp. (deg R):	510.6529
Daily Min. Liquid Surface Temp. (deg R):	502.3414
Daily Max. Liquid Surface Temp. (deg R):	518.9645
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.8396
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	2.4032
Vapor Space Outage (ft):	1.5000
Working Losses (lb):	1.2874
Vapor Molecular Weight (lb/lb-mole):	50.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	2.4032
Annual Net Throughput (gal/yr.):	600.0000
Annual Turnovers:	4.0000
Turnover Factor:	1.0000
Tank Diameter (ft):	3.0000
Working Loss Product Factor:	0.7500
Total Losses (lb):	23.9629

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

Amoco - Horizontal Tank
Gallup, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Crude oil (RVP 5)	1.29	22.68	23.96

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	AM-TK1
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Vertical Fixed Roof Tank
Description:	Amining solution (MDEA)

Tank Dimensions

Shell Height (ft):	12.00
Diameter (ft):	6.00
Liquid Height (ft) :	12.00
Avg. Liquid Height (ft):	6.00
Volume (gallons):	2,500.00
Turnovers:	3.00
Net Throughput(gal/yr):	7,500.00
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Light
Shell Condition	Good
Roof Color/Shade:	Gray/Light
Roof Condition:	Good

Roof Characteristics

Type:	Cone
Height (ft)	1.00
Slope (ft/ft) (Cone Roof)	0.33

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

AM-TK1 - Vertical Fixed Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
N-Methyldiethanolamine (MDEA)	All	57.39	44.50	70.27	50.84	0.0002	0.0002	0.0002	119.1600			119.16	Option 1: VP50 = .0002 VP60 = .0002

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

AM-TK1 - Vertical Fixed Roof Tank
Gallup, NM

Annual Emission Calcaulations

Standing Losses (lb):	0.0265
Vapor Space Volume (cu ft):	179.0708
Vapor Density (lb/cu ft):	0.0000
Vapor Space Expansion Factor:	0.0944
Vented Vapor Saturation Factor:	0.9999
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	179.0708
Tank Diameter (ft):	6.0000
Vapor Space Outage (ft):	6.3333
Tank Shell Height (ft):	12.0000
Average Liquid Height (ft):	6.0000
Roof Outage (ft):	0.3333
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.3333
Roof Height (ft):	1.0000
Roof Slope (ft/ft):	0.3300
Shell Radius (ft):	3.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0000
Vapor Molecular Weight (lb/lb-mole):	119.1600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0002
Daily Avg. Liquid Surface Temp. (deg. R):	517.0582
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	510.5100
Tank Paint Solar Absorptance (Shell):	0.5400
Tank Paint Solar Absorptance (Roof):	0.5400
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0944
Daily Vapor Temperature Range (deg. R):	51.5419
Daily Vapor Pressure Range (psia):	0.0000
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0002
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0002
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0002
Daily Avg. Liquid Surface Temp. (deg R):	517.0582
Daily Min. Liquid Surface Temp. (deg R):	504.1727
Daily Max. Liquid Surface Temp. (deg R):	529.9436
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9999
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0002
Vapor Space Outage (ft):	6.3333
Working Losses (lb):	0.0043
Vapor Molecular Weight (lb/lb-mole):	119.1600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0002
Annual Net Throughput (gal/yr.):	7,500.0000
Annual Turnovers:	3.0000
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	2,500.0000
Maximum Liquid Height (ft):	12.0000
Tank Diameter (ft):	6.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	0.0307

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

AM-TK1 - Vertical Fixed Roof Tank
Gallup, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
N-Methyldiethanolamine (MDEA)	0.00	0.03	0.03

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Chevron
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Vertical Fixed Roof Tank
Description:	Gasoline Additive

Tank Dimensions

Shell Height (ft):	17.00
Diameter (ft):	10.00
Liquid Height (ft) :	17.00
Avg. Liquid Height (ft):	3.00
Volume (gallons):	10,000.00
Turnovers:	0.65
Net Throughput(gal/yr):	6,500.00
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Roof Characteristics

Type:	Cone
Height (ft)	1.00
Slope (ft/ft) (Cone Roof)	0.20

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Chevron - Vertical Fixed Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Chevron additive (OGA 480)	All	50.98	42.67	59.29	48.62	0.0486	0.0371	0.0631	106.0000			200.00	Option 4: RVP=.2, ASTM Slope=2.5
1,2,4-Trimethylbenzene						0.0141	0.0099	0.0199	120.1900	0.1100	0.0603	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Isopropyl benzene						0.0362	0.0259	0.0498	120.2000	0.0200	0.0281	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Unidentified Components						0.0561	0.0442	0.0508	104.5817	0.8200	0.7847	237.86	
Xylene (-m)						0.0654	0.0479	0.0882	106.1700	0.0500	0.1269	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Chevron - Vertical Fixed Roof Tank
Gallup, NM

Annual Emission Calcaulations

Standing Losses (lb):	23.1262
Vapor Space Volume (cu ft):	1,125.7374
Vapor Density (lb/cu ft):	0.0009
Vapor Space Expansion Factor:	0.0621
Vented Vapor Saturation Factor:	0.9644
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	1,125.7374
Tank Diameter (ft):	10.0000
Vapor Space Outage (ft):	14.3333
Tank Shell Height (ft):	17.0000
Average Liquid Height (ft):	3.0000
Roof Outage (ft):	0.3333
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.3333
Roof Height (ft):	1.0000
Roof Slope (ft/ft):	0.2000
Shell Radius (ft):	5.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0009
Vapor Molecular Weight (lb/lb-mole):	106.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0486
Daily Avg. Liquid Surface Temp. (deg. R):	510.6529
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	508.2900
Tank Paint Solar Absorptance (Shell):	0.1700
Tank Paint Solar Absorptance (Roof):	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0621
Daily Vapor Temperature Range (deg. R):	33.2462
Daily Vapor Pressure Range (psia):	0.0260
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0486
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0371
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0631
Daily Avg. Liquid Surface Temp. (deg R):	510.6529
Daily Min. Liquid Surface Temp. (deg R):	502.3414
Daily Max. Liquid Surface Temp. (deg R):	518.9645
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9644
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0486
Vapor Space Outage (ft):	14.3333
Working Losses (lb):	0.7972
Vapor Molecular Weight (lb/lb-mole):	106.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0486
Annual Net Throughput (gal/yr.):	6,500.0000
Annual Turnovers:	0.6508
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	10,000.0000
Maximum Liquid Height (ft):	17.0000
Tank Diameter (ft):	10.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	23.9234

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

Chevron - Vertical Fixed Roof Tank
Gallup, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Chevron additive (OGA 480)	0.80	23.13	23.92
1,2,4-Trimethylbenzene	0.05	1.39	1.44
Isopropyl benzene	0.02	0.65	0.67
Xylene (-m)	0.10	2.93	3.04
Unidentified Components	0.63	18.15	18.77

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Conoco
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Horizontal Tank
Description:	Gasoline additive

Tank Dimensions

Shell Length (ft):	11.00
Diameter (ft):	4.00
Volume (gallons):	1,000.00
Turnovers:	0.20
Net Throughput(gal/yr):	200.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Conoco - Horizontal Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
PHILLIPS Additive (Super Clean)	All	50.98	42.67	59.29	48.62	0.0439	0.0322	0.0595	107.1558			153.18	Option 4: RVP=.2, ASTM Slope=2.5
Distillate - Ciniza						0.0048	0.0035	0.0072	130.0000	0.5700	0.0502	230.00	Option 1: VP50 = .0045 VP60 = .0074
Ethylbenzene						0.0787	0.0578	0.1059	106.1700	0.0800	0.2051	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Xylene (-m)						0.0654	0.0479	0.0882	106.1700	0.3500	0.7448	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Conoco - Horizontal Tank
Gallup, NM

Annual Emission Calcaulations

Standing Losses (lb):	1.7084
Vapor Space Volume (cu ft):	88.0446
Vapor Density (lb/cu ft):	0.0009
Vapor Space Expansion Factor:	0.0622
Vented Vapor Saturation Factor:	0.9954
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	88.0446
Tank Diameter (ft):	4.0000
Effective Diameter (ft):	7.4867
Vapor Space Outage (ft):	2.0000
Tank Shell Length (ft):	11.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0009
Vapor Molecular Weight (lb/lb-mole):	107.1558
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0439
Daily Avg. Liquid Surface Temp. (deg. R):	510.6529
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	508.2900
Tank Paint Solar Absorptance (Shell):	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0622
Daily Vapor Temperature Range (deg. R):	33.2462
Daily Vapor Pressure Range (psia):	0.0273
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0439
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0322
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0595
Daily Avg. Liquid Surface Temp. (deg R):	510.6529
Daily Min. Liquid Surface Temp. (deg R):	502.3414
Daily Max. Liquid Surface Temp. (deg R):	518.9645
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9954
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0439
Vapor Space Outage (ft):	2.0000
Working Losses (lb):	0.0224
Vapor Molecular Weight (lb/lb-mole):	107.1558
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0439
Annual Net Throughput (gal/yr.):	200.0000
Annual Turnovers:	0.2000
Turnover Factor:	1.0000
Tank Diameter (ft):	4.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	1.7308

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

Conoco - Horizontal Tank
Gallup, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
PHILLIPS Additive (Super Clean)	0.02	1.71	1.73
Ethylbenzene	0.00	0.35	0.35
Xylene (-m)	0.02	1.27	1.29
Distillate - Ciniza	0.00	0.09	0.09

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Exxon
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Horizontal Tank
Description:	Gasoline additive

Tank Dimensions

Shell Length (ft):	16.00
Diameter (ft):	4.00
Volume (gallons):	1,512.00
Turnovers:	13.23
Net Throughput(gal/yr):	20,000.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Exxon - Horizontal Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
EXXON Additive (Paradyne 755)	All	50.98	42.67	59.29	48.62	0.0486	0.0371	0.0631	106.0000			200.00	Option 4: RVP=.2, ASTM Slope=2.5
Unidentified Components						0.0268	-0.0650	-0.0028	105.4614	0.7000	0.2387	321.94	
Xylene (-m)						0.0654	0.0479	0.0882	106.1700	0.3000	0.7613	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Exxon - Horizontal Tank
Gallup, NM

Annual Emission Calcaulations

Standing Losses (lb):	2.7140
Vapor Space Volume (cu ft):	128.0649
Vapor Density (lb/cu ft):	0.0009
Vapor Space Expansion Factor:	0.0621
Vented Vapor Saturation Factor:	0.9949
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	128.0649
Tank Diameter (ft):	4.0000
Effective Diameter (ft):	9.0293
Vapor Space Outage (ft):	2.0000
Tank Shell Length (ft):	16.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0009
Vapor Molecular Weight (lb/lb-mole):	106.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0486
Daily Avg. Liquid Surface Temp. (deg. R):	510.6529
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	508.2900
Tank Paint Solar Absorptance (Shell):	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0621
Daily Vapor Temperature Range (deg. R):	33.2462
Daily Vapor Pressure Range (psia):	0.0260
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0486
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0371
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0631
Daily Avg. Liquid Surface Temp. (deg R):	510.6529
Daily Min. Liquid Surface Temp. (deg R):	502.3414
Daily Max. Liquid Surface Temp. (deg R):	518.9645
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9949
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0486
Vapor Space Outage (ft):	2.0000
Working Losses (lb):	2.4530
Vapor Molecular Weight (lb/lb-mole):	106.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0486
Annual Net Throughput (gal/yr.):	20,000.0000
Annual Turnovers:	13.2275
Turnover Factor:	1.0000
Tank Diameter (ft):	4.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	5.1670

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

Exxon - Horizontal Tank
Gallup, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
EXXON Additive (Paradyne 755)	2.45	2.71	5.17
Xylene (-m)	1.87	2.07	3.93
Unidentified Components	0.59	0.65	1.23

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Fire Pump
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Horizontal Tank
Description:	Diesel day tank

Tank Dimensions

Shell Length (ft):	6.00
Diameter (ft):	4.00
Volume (gallons):	500.00
Turnovers:	1.00
Net Throughput(gal/yr):	500.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Medium
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Fire Pump - Horizontal Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Diesel #2 - Ciniza	All	59.81	45.20	74.43	51.68	0.0073	0.0038	0.0103	130.0000			217.00	Option 1: VP50 = .0045 VP60 = .0074
1,2,4-Trimethylbenzene						0.0203	0.0110	0.0357	120.1900	0.0039	0.0180	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane						0.5925	0.3829	0.8906	114.2300	0.0001	0.0135	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Cyclohexane						1.2053	0.7997	1.7681	84.1600	0.0004	0.1096	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1078	0.0636	0.1763	106.1700	0.0002	0.0049	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Isopropyl benzene						0.0508	0.0287	0.0861	120.2000	0.0001	0.0012	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Naphthalene						0.0024	0.0013	0.0045	128.0000	0.0018	0.0010	128.00	Option 1: VP50 = .0015 VP60 = .0024
Toluene						0.3282	0.2047	0.5098	92.1300	0.0006	0.0448	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.0050	0.0037	0.0037	147.8358	0.9908	0.7644	218.86	
Xylene (-m)						0.0898	0.0527	0.1476	106.1700	0.0021	0.0428	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Fire Pump - Horizontal Tank
Gallup, NM

Annual Emission Calcaulations

Standing Losses (lb):	0.3235
Vapor Space Volume (cu ft):	48.0243
Vapor Density (lb/cu ft):	0.0002
Vapor Space Expansion Factor:	0.1078
Vented Vapor Saturation Factor:	0.9992
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	48.0243
Tank Diameter (ft):	4.0000
Effective Diameter (ft):	5.5293
Vapor Space Outage (ft):	2.0000
Tank Shell Length (ft):	6.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0002
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0073
Daily Avg. Liquid Surface Temp. (deg. R):	519.4818
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	511.3500
Tank Paint Solar Absorptance (Shell):	0.6800
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.1078
Daily Vapor Temperature Range (deg. R):	58.4646
Daily Vapor Pressure Range (psia):	0.0065
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0073
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0038
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0103
Daily Avg. Liquid Surface Temp. (deg R):	519.4818
Daily Min. Liquid Surface Temp. (deg R):	504.8656
Daily Max. Liquid Surface Temp. (deg R):	534.0979
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9992
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0073
Vapor Space Outage (ft):	2.0000
Working Losses (lb):	0.0114
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0073
Annual Net Throughput (gal/yr.):	500.0000
Annual Turnovers:	1.0000
Turnover Factor:	1.0000
Tank Diameter (ft):	4.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	0.3348

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

Fire Pump - Horizontal Tank
Gallup, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Diesel #2 - Ciniza	0.01	0.32	0.33
Cyclohexane	0.00	0.04	0.04
2,2,4-Trimethylpentane	0.00	0.00	0.00
Toluene	0.00	0.01	0.01
Ethylbenzene	0.00	0.00	0.00
Xylene (-m)	0.00	0.01	0.01
Isopropyl benzene	0.00	0.00	0.00
1,2,4-Trimethylbenzene	0.00	0.01	0.01
Naphthalene	0.00	0.00	0.00
Unidentified Components	0.01	0.25	0.26

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Mobil
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Horizontal Tank
Description:	Gasoline additive

Tank Dimensions

Shell Length (ft):	21.00
Diameter (ft):	8.00
Volume (gallons):	8,000.00
Turnovers:	0.44
Net Throughput(gal/yr):	3,500.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Mobil - Horizontal Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
MOBIL Additive (MTT 246)	All	50.98	42.67	59.29	48.62	0.0486	0.0371	0.0631	106.0000			200.00	Option 4: RVP=.2, ASTM Slope=2.5
Ethylbenzene						0.0787	0.0578	0.1059	106.1700	0.0600	0.1834	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Unidentified Components						0.0282	-0.0350	0.0036	105.5731	0.7300	0.2837	297.12	
Xylene (-m)						0.0654	0.0479	0.0882	106.1700	0.2100	0.5329	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Mobil - Horizontal Tank
Gallup, NM

Annual Emission Calcaulations

Standing Losses (lb):	14.1759
Vapor Space Volume (cu ft):	672.3408
Vapor Density (lb/cu ft):	0.0009
Vapor Space Expansion Factor:	0.0621
Vented Vapor Saturation Factor:	0.9898
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	672.3408
Tank Diameter (ft):	8.0000
Effective Diameter (ft):	14.6292
Vapor Space Outage (ft):	4.0000
Tank Shell Length (ft):	21.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0009
Vapor Molecular Weight (lb/lb-mole):	106.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0486
Daily Avg. Liquid Surface Temp. (deg. R):	510.6529
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	508.2900
Tank Paint Solar Absorptance (Shell):	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0621
Daily Vapor Temperature Range (deg. R):	33.2462
Daily Vapor Pressure Range (psia):	0.0260
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0486
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0371
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0631
Daily Avg. Liquid Surface Temp. (deg R):	510.6529
Daily Min. Liquid Surface Temp. (deg R):	502.3414
Daily Max. Liquid Surface Temp. (deg R):	518.9645
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9898
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0486
Vapor Space Outage (ft):	4.0000
Working Losses (lb):	0.4293
Vapor Molecular Weight (lb/lb-mole):	106.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0486
Annual Net Throughput (gal/yr.):	3,500.0000
Annual Turnovers:	0.4375
Turnover Factor:	1.0000
Tank Diameter (ft):	8.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	14.6051

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

Mobil - Horizontal Tank
Gallup, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
MOBIL Additive (MTT 246)	0.43	14.18	14.61
Ethylbenzene	0.08	2.60	2.68
Xylene (-m)	0.23	7.55	7.78
Unidentified Components	0.12	4.02	4.14

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	O.C. Diesel
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Horizontal Tank
Description:	Diesel fuel for plant use

Tank Dimensions

Shell Length (ft):	21.00
Diameter (ft):	5.00
Volume (gallons):	3,000.00
Turnovers:	6.67
Net Throughput(gal/yr):	20,000.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

O.C. Diesel - Horizontal Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Diesel #2 - Ciniza	All	50.98	42.67	59.29	48.62	0.0048	0.0035	0.0072	130.0000			217.00	Option 1: VP50 = .0045 VP60 = .0074
1,2,4-Trimethylbenzene						0.0141	0.0099	0.0199	120.1900	0.0039	0.0192	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane						0.4568	0.3539	0.5837	114.2300	0.0001	0.0159	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Cyclohexane						0.9439	0.7428	1.1885	84.1600	0.0004	0.1317	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0787	0.0578	0.1059	106.1700	0.0002	0.0055	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Isopropyl benzene						0.0362	0.0259	0.0498	120.2000	0.0001	0.0013	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Naphthalene						0.0016	0.0011	0.0023	128.0000	0.0018	0.0010	128.00	Option 1: VP50 = .0015 VP60 = .0024
Toluene						0.2478	0.1881	0.3230	92.1300	0.0006	0.0519	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.0030	0.0025	0.0025	152.9611	0.9908	0.7256	218.86	
Xylene (-m)						0.0654	0.0479	0.0882	106.1700	0.0021	0.0479	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

O.C. Diesel - Horizontal Tank
Gallup, NM

Annual Emission Calcaulations

Standing Losses (lb):	0.6538
Vapor Space Volume (cu ft):	262.6331
Vapor Density (lb/cu ft):	0.0001
Vapor Space Expansion Factor:	0.0601
Vented Vapor Saturation Factor:	0.9994
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	262.6331
Tank Diameter (ft):	5.0000
Effective Diameter (ft):	11.5654
Vapor Space Outage (ft):	2.5000
Tank Shell Length (ft):	21.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0001
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0048
Daily Avg. Liquid Surface Temp. (deg. R):	510.6529
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	508.2900
Tank Paint Solar Absorptance (Shell):	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0601
Daily Vapor Temperature Range (deg. R):	33.2462
Daily Vapor Pressure Range (psia):	0.0037
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0048
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0035
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0072
Daily Avg. Liquid Surface Temp. (deg R):	510.6529
Daily Min. Liquid Surface Temp. (deg R):	502.3414
Daily Max. Liquid Surface Temp. (deg R):	518.9645
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9994
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0048
Vapor Space Outage (ft):	2.5000
Working Losses (lb):	0.2962
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0048
Annual Net Throughput (gal/yr.):	20,000.0000
Annual Turnovers:	6.6667
Turnover Factor:	1.0000
Tank Diameter (ft):	5.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	0.9501

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

O.C. Diesel - Horizontal Tank
Gallup, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Diesel #2 - Ciniza	0.30	0.65	0.95
Cyclohexane	0.04	0.09	0.13
2,2,4-Trimethylpentane	0.00	0.01	0.02
Toluene	0.02	0.03	0.05
Ethylbenzene	0.00	0.00	0.01
Xylene (-m)	0.01	0.03	0.05
Isopropyl benzene	0.00	0.00	0.00
1,2,4-Trimethylbenzene	0.01	0.01	0.02
Naphthalene	0.00	0.00	0.00
Unidentified Components	0.21	0.47	0.69

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	O.C. Gasoline
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Horizontal Tank
Description:	Gasoline for plant use

Tank Dimensions

Shell Length (ft):	21.00
Diameter (ft):	5.00
Volume (gallons):	3,000.00
Turnovers:	10.00
Net Throughput(gal/yr):	30,000.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

O.C. Gasoline - Horizontal Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Gasoline (87 Oct. Base) - Ciniza	All	50.98	42.67	59.29	48.62	4.1571	3.4957	4.9162	67.0000			95.00	Option 4: RVP=9.8, ASTM Slope=2.5
1,2,4-Trimethylbenzene						0.0141	0.0099	0.0199	120.1900	0.0226	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
1-Pentene						7.1230	5.8906	8.5527	70.1400	0.0019	0.0046	70.14	Option 2: A=6.8442, B=1044.01, C=233.5
2,2,4-Trimethylpentane						0.4568	0.3539	0.5837	114.2300	0.0134	0.0021	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
2-Methyl-1-butene						3.6877	3.0668	4.4043	70.1300	0.0043	0.0054	70.13	Option 2: A=6.4863, B=1039.69, C=236.65
2-Pentene						5.1474	4.3404	6.3942	70.1400	0.0081	0.0142	70.14	Option 1: VP50 = 5 VP60 = 6.5
Benzene						0.9046	0.7076	1.1452	78.1100	0.0247	0.0076	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.9439	0.7428	1.1885	84.1600	0.0100	0.0032	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0787	0.0578	0.1059	106.1700	0.0094	0.0003	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.5057	1.1963	1.8786	86.1700	0.0219	0.0112	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopentane						8.0970	6.4152	9.8557	72.1500	0.1522	0.4203	72.15	Option 1: VP50 = 7.889 VP60 = 10.005
Isopropyl benzene						0.0362	0.0259	0.0498	120.2000	0.0008	0.0000	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Naphthalene						0.0016	0.0011	0.0023	128.0000	0.0026	0.0000	128.00	Option 1: VP50 = .0015 VP60 = .0024
Pentane (-n)						5.5760	4.5917	6.7293	72.1500	0.0329	0.0626	72.15	Option 3: A=27691, B=7.558
Phenol						0.0052	0.0043	0.0069	94.0000	0.0006	0.0000	94.00	Option 1: VP50 = .005 VP60 = .007
Toluene						0.2478	0.1881	0.3230	92.1300	0.0532	0.0045	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.1511	3.2600	3.2600	61.3341	0.5626	0.4620	105.73	
Xylene (-m)						0.0654	0.0479	0.0882	106.1700	0.0789	0.0018	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

O.C. Gasoline - Horizontal Tank
Gallup, NM

Annual Emission Calcaulations

Standing Losses (lb):	802.9335
Vapor Space Volume (cu ft):	262.6331
Vapor Density (lb/cu ft):	0.0508
Vapor Space Expansion Factor:	0.2556
Vented Vapor Saturation Factor:	0.6448
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	262.6331
Tank Diameter (ft):	5.0000
Effective Diameter (ft):	11.5654
Vapor Space Outage (ft):	2.5000
Tank Shell Length (ft):	21.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0508
Vapor Molecular Weight (lb/lb-mole):	67.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	4.1571
Daily Avg. Liquid Surface Temp. (deg. R):	510.6529
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	508.2900
Tank Paint Solar Absorptance (Shell):	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.2556
Daily Vapor Temperature Range (deg. R):	33.2462
Daily Vapor Pressure Range (psia):	1.4204
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	4.1571
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	3.4957
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	4.9162
Daily Avg. Liquid Surface Temp. (deg R):	510.6529
Daily Min. Liquid Surface Temp. (deg R):	502.3414
Daily Max. Liquid Surface Temp. (deg R):	518.9645
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.6448
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	4.1571
Vapor Space Outage (ft):	2.5000
Working Losses (lb):	198.9455
Vapor Molecular Weight (lb/lb-mole):	67.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	4.1571
Annual Net Throughput (gal/yr.):	30,000.0000
Annual Turnovers:	10.0000
Turnover Factor:	1.0000
Tank Diameter (ft):	5.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	1,001.8790

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

O.C. Gasoline - Horizontal Tank
Gallup, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Gasoline (87 Oct. Base) - Ciniza	198.95	802.93	1,001.88
Isopentane	83.62	337.50	421.13
1-Pentene	0.92	3.71	4.62
2-Methyl-1-butene	1.08	4.34	5.42
Pentane (-n)	12.45	50.24	62.69
2-Pentene	2.83	11.42	14.25
Hexane (-n)	2.24	9.03	11.27
Benzene	1.52	6.12	7.63
Cyclohexane	0.64	2.59	3.23
2,2,4-Trimethylpentane	0.42	1.68	2.09
Toluene	0.89	3.61	4.50
Ethylbenzene	0.05	0.20	0.25
Xylene (-m)	0.35	1.41	1.76
Isopropyl benzene	0.00	0.01	0.01
1,2,4-Trimethylbenzene	0.02	0.09	0.11
Naphthalene	0.00	0.00	0.00
Phenol	0.00	0.00	0.00
Unidentified Components	91.92	370.99	462.91

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Shell
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Horizontal Tank
Description:	Gasoline additive (HiTEC 6442)

Tank Dimensions

Shell Length (ft):	21.00
Diameter (ft):	8.00
Volume (gallons):	8,000.00
Turnovers:	0.33
Net Throughput(gal/yr):	2,600.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Shell - Horizontal Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
HiTEC 6442 Gasoline Additive	All	50.98	42.67	59.29	48.62	0.0486	0.0371	0.0631	106.0000			200.00	Option 4: RVP=.2, ASTM Slope=2.5
1,2,4-Trimethylbenzene						0.0141	0.0099	0.0199	120.1900	0.1790	0.0981	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Isopropyl benzene						0.0362	0.0259	0.0498	120.2000	0.0270	0.0379	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Unidentified Components						0.0650	0.0508	0.0577	103.7594	0.7500	0.7523	261.18	
Xylene (-m)						0.0654	0.0479	0.0882	106.1700	0.0440	0.1117	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Shell - Horizontal Tank
Gallup, NM

Annual Emission Calcaulations

Standing Losses (lb):	14.1759
Vapor Space Volume (cu ft):	672.3408
Vapor Density (lb/cu ft):	0.0009
Vapor Space Expansion Factor:	0.0621
Vented Vapor Saturation Factor:	0.9898
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	672.3408
Tank Diameter (ft):	8.0000
Effective Diameter (ft):	14.6292
Vapor Space Outage (ft):	4.0000
Tank Shell Length (ft):	21.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0009
Vapor Molecular Weight (lb/lb-mole):	106.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0486
Daily Avg. Liquid Surface Temp. (deg. R):	510.6529
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	508.2900
Tank Paint Solar Absorptance (Shell):	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0621
Daily Vapor Temperature Range (deg. R):	33.2462
Daily Vapor Pressure Range (psia):	0.0260
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0486
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0371
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0631
Daily Avg. Liquid Surface Temp. (deg R):	510.6529
Daily Min. Liquid Surface Temp. (deg R):	502.3414
Daily Max. Liquid Surface Temp. (deg R):	518.9645
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9898
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0486
Vapor Space Outage (ft):	4.0000
Working Losses (lb):	0.3189
Vapor Molecular Weight (lb/lb-mole):	106.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0486
Annual Net Throughput (gal/yr.):	2,600.0000
Annual Turnovers:	0.3250
Turnover Factor:	1.0000
Tank Diameter (ft):	8.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	14.4947

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

Shell - Horizontal Tank
Gallup, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
HiTEC 6442 Gasoline Additive	0.32	14.18	14.49
1,2,4-Trimethylbenzene	0.03	1.39	1.42
Isopropyl benzene	0.01	0.54	0.55
Xylene (-m)	0.04	1.58	1.62
Unidentified Components	0.24	10.66	10.90

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T-1
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Vertical Fixed Roof Tank
Description:	Diesel storage tank

Tank Dimensions

Shell Height (ft):	24.00
Diameter (ft):	30.00
Liquid Height (ft) :	24.00
Avg. Liquid Height (ft):	12.00
Volume (gallons):	126,000.00
Turnovers:	714.29
Net Throughput(gal/yr):	90,000,000.00
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Roof Characteristics

Type:	Cone
Height (ft)	1.00
Slope (ft/ft) (Cone Roof)	0.07

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-1 - Vertical Fixed Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Diesel #2 - Ciniza	All	50.98	42.67	59.29	48.62	0.0048	0.0035	0.0072	130.0000			217.00	Option 1: VP50 = .0045 VP60 = .0074
1,2,4-Trimethylbenzene						0.0141	0.0099	0.0199	120.1900	0.0039	0.0192	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane						0.4568	0.3539	0.5837	114.2300	0.0001	0.0159	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Cyclohexane						0.9439	0.7428	1.1885	84.1600	0.0004	0.1317	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0787	0.0578	0.1059	106.1700	0.0002	0.0055	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Isopropyl benzene						0.0362	0.0259	0.0498	120.2000	0.0001	0.0013	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Naphthalene						0.0016	0.0011	0.0023	128.0000	0.0018	0.0010	128.00	Option 1: VP50 = .0015 VP60 = .0024
Toluene						0.2478	0.1881	0.3230	92.1300	0.0006	0.0519	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.0030	0.0025	0.0025	152.9611	0.9908	0.7256	218.86	
Xylene (-m)						0.0654	0.0479	0.0882	106.1700	0.0021	0.0479	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T-1 - Vertical Fixed Roof Tank
Gallup, NM

Annual Emission Calcaulations

Standing Losses (lb):	21.6497
Vapor Space Volume (cu ft):	8,717.9196
Vapor Density (lb/cu ft):	0.0001
Vapor Space Expansion Factor:	0.0601
Vented Vapor Saturation Factor:	0.9969
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	8,717.9196
Tank Diameter (ft):	30.0000
Vapor Space Outage (ft):	12.3333
Tank Shell Height (ft):	24.0000
Average Liquid Height (ft):	12.0000
Roof Outage (ft):	0.3333
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.3333
Roof Height (ft):	1.0000
Roof Slope (ft/ft):	0.0700
Shell Radius (ft):	15.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0001
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0048
Daily Avg. Liquid Surface Temp. (deg. R):	510.6529
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	508.2900
Tank Paint Solar Absorptance (Shell):	0.1700
Tank Paint Solar Absorptance (Roof):	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0601
Daily Vapor Temperature Range (deg. R):	33.2462
Daily Vapor Pressure Range (psia):	0.0037
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0048
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0035
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0072
Daily Avg. Liquid Surface Temp. (deg R):	510.6529
Daily Min. Liquid Surface Temp. (deg R):	502.3414
Daily Max. Liquid Surface Temp. (deg R):	518.9645
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9969
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0048
Vapor Space Outage (ft):	12.3333
Working Losses (lb):	278.1482
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0048
Annual Net Throughput (gal/yr.):	90,000,000.0000
Annual Turnovers:	714.2857
Turnover Factor:	0.2087
Maximum Liquid Volume (gal):	126,000.0000
Maximum Liquid Height (ft):	24.0000
Tank Diameter (ft):	30.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	299.7979

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-1 - Vertical Fixed Roof Tank
Gallup, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Diesel #2 - Ciniza	278.15	21.65	299.80
Cyclohexane	36.64	2.85	39.49
2,2,4-Trimethylpentane	4.43	0.34	4.78
Toluene	14.43	1.12	15.55
Ethylbenzene	1.53	0.12	1.65
Xylene (-m)	13.32	1.04	14.35
Isopropyl benzene	0.35	0.03	0.38
1,2,4-Trimethylbenzene	5.34	0.42	5.76
Naphthalene	0.28	0.02	0.30
Unidentified Components	201.84	15.71	217.55

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T-2
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Internal Floating Roof Tank
Description:	High-octane base gasoline

Tank Dimensions

Diameter (ft):	30.00
Volume (gallons):	168,000.00
Turnovers:	119.05
Self Supp. Roof? (y/n):	N
No. of Columns:	1.00
Eff. Col. Diam. (ft):	1.00

Paint Characteristics

Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Rim-Seal System

Primary Seal:	Liquid-mounted
Secondary Seal	None

Deck Characteristics

Deck Fitting Category:	Detail
Deck Type:	Welded

Deck Fitting/Status	Quantity
Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed	1
Automatic Gauge Float Well/Bolted Cover, Gasketed	1
Roof Leg (3-in. Diameter)/Adjustable, Center Area, Gasketed	10
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Ladder Well (36-in. Diam.)/Sliding Cover, Gasketed	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-2 - Internal Floating Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Gasoline (89 Oct. Base) - Ciniza	All	50.98	42.67	59.29	48.62	3.9637	N/A	N/A	67.0000			97.00	Option 4: RVP=9.4, ASTM Slope=2.5
1,2,4-Trimethylbenzene						0.0141	N/A	N/A	120.1900	0.0148	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
1-Pentene						7.1230	N/A	N/A	70.1400	0.0006	0.0016	70.14	Option 2: A=6.8442, B=1044.01, C=233.5
2,2,4-Trimethylpentane						0.4568	N/A	N/A	114.2300	0.0709	0.0118	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
2-Methyl-1-butene						3.6877	N/A	N/A	70.1300	0.0013	0.0018	70.13	Option 2: A=6.4863, B=1039.69, C=236.65
2-Pentene						5.1474	N/A	N/A	70.1400	0.0023	0.0043	70.14	Option 1: VP50 = 5 VP60 = 6.5
Benzene						0.9046	N/A	N/A	78.1100	0.0158	0.0052	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.9439	N/A	N/A	84.1600	0.0045	0.0016	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0787	N/A	N/A	106.1700	0.0052	0.0001	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.5057	N/A	N/A	86.1700	0.0109	0.0060	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopentane						8.0970	N/A	N/A	72.1500	0.1178	0.3484	72.15	Option 1: VP50 = 7.889 VP60 = 10.005
Isopropyl benzene						0.0362	N/A	N/A	120.2000	0.0003	0.0000	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Naphthalene						0.0016	N/A	N/A	128.0000	0.0015	0.0000	128.00	Option 1: VP50 = .0015 VP60 = .0024
Pentane (-n)						5.5760	N/A	N/A	72.1500	0.0176	0.0358	72.15	Option 3: A=27691, B=7.558
Phenol						0.0052	N/A	N/A	94.0000	0.0006	0.0000	94.00	Option 1: VP50 = .005 VP60 = .007
Toluene						0.2478	N/A	N/A	92.1300	0.0819	0.0074	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.3746	N/A	N/A	62.8738	0.5935	0.5744	103.79	
Xylene (-m)						0.0654	N/A	N/A	106.1700	0.0606	0.0014	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T-2 - Internal Floating Roof Tank
Gallup, NM

Annual Emission Calcaulations

Rim Seal Losses (lb):	345.9557
Seal Factor A (lb-mole/ft-yr):	1.6000
Seal Factor B (lb-mole/ft-yr (mph)^n):	0.3000
Value of Vapor Pressure Function:	0.1076
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	3.9637
Tank Diameter (ft):	30.0000
Vapor Molecular Weight (lb/lb-mole):	67.0000
Product Factor:	1.0000
Withdrawal Losses (lb):	135.9567
Number of Columns:	1.0000
Effective Column Diameter (ft):	1.0000
Annual Net Throughput (gal/yr.):	20,000,000.0000
Shell Clingage Factor (bbl/1000 sqft):	0.0015
Average Organic Liquid Density (lb/gal):	5.8600
Tank Diameter (ft):	30.0000
Deck Fitting Losses (lb):	774.6526
Value of Vapor Pressure Function:	0.1076
Vapor Molecular Weight (lb/lb-mole):	67.0000
Product Factor:	1.0000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	107.4800
Deck Seam Losses (lb):	0.0000
Deck Seam Length (ft):	0.0000
Deck Seam Loss per Unit Length Factor (lb-mole/ft-yr):	0.0000
Deck Seam Length Factor(ft/sqft):	0.0000
Tank Diameter (ft):	30.0000
Vapor Molecular Weight (lb/lb-mole):	67.0000
Product Factor:	1.0000
Total Losses (lb):	1,256.5650

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors KFa(lb-mole/yr)	KFb(lb-mole/(yr mph^n))	m	Losses(lb)
Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed	1	36.00	5.90	1.20	259.4668
Automatic Gauge Float Well/Bolted Cover, Gasketed	1	2.80	0.00	0.00	20.1808
Roof Leg (3-in. Diameter)/Adjustable, Center Area, Gasketed	10	0.53	0.11	0.13	38.1993
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Gask.	1	0.47	0.02	0.97	3.3875
Ladder Well (36-in. Diam.)/Sliding Cover, Gasketed	1	56.00	0.00	0.00	403.6150
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	44.6860
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1	0.71	0.10	1.00	5.1173

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-2 - Internal Floating Roof Tank
Gallup, NM

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Gasoline (89 Oct. Base) - Ciniza	345.96	135.96	774.65	0.00	1,256.56
Isopentane	120.53	16.02	269.88	0.00	406.43
1-Pentene	0.54	0.08	1.21	0.00	1.83
2-Methyl-1-butene	0.61	0.18	1.36	0.00	2.14
Pentane (-n)	12.40	2.39	27.77	0.00	42.56
2-Pentene	1.50	0.31	3.35	0.00	5.16
Hexane (-n)	2.07	1.48	4.64	0.00	8.20
Benzene	1.81	2.15	4.04	0.00	8.00
Cyclohexane	0.54	0.61	1.20	0.00	2.35
2,2,4-Trimethylpentane	4.09	9.64	9.16	0.00	22.90
Toluene	2.56	11.13	5.74	0.00	19.44
Ethylbenzene	0.05	0.71	0.12	0.00	0.87
Xylene (-m)	0.50	8.24	1.12	0.00	9.86
Isopropyl benzene	0.00	0.04	0.00	0.00	0.05
1,2,4-Trimethylbenzene	0.03	2.01	0.06	0.00	2.10
Naphthalene	0.00	0.20	0.00	0.00	0.20
Phenol	0.00	0.07	0.00	0.00	0.08
Unidentified Components	198.73	80.68	444.99	0.00	724.40

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T-3
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Internal Floating Roof Tank
Description:	Mid-octane base gasoline

Tank Dimensions

Diameter (ft):	30.00
Volume (gallons):	168,000.00
Turnovers:	952.38
Self Supp. Roof? (y/n):	N
No. of Columns:	1.00
Eff. Col. Diam. (ft):	1.00

Paint Characteristics

Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Rim-Seal System

Primary Seal:	Liquid-mounted
Secondary Seal	None

Deck Characteristics

Deck Fitting Category:	Detail
Deck Type:	Welded

Deck Fitting/Status	Quantity
Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed	1
Automatic Gauge Float Well/Bolted Cover, Gasketed	1
Sample Pipe or Well (24-in. Diam.)/Slotted Pipe-Sliding Cover, Gask.	1
Roof Leg (3-in. Diameter)/Adjustable, Center Area, Gasketed	10
Ladder Well (36-in Diam.)/Sliding Cover, Gasketed	10
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Gask.	1

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-3 - Internal Floating Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Gasoline (87 Oct. Base) - Ciniza	All	50.98	42.67	59.29	48.62	4.1571	N/A	N/A	67.0000			95.00	Option 4: RVP=9.8, ASTM Slope=2.5
1,2,4-Trimethylbenzene						0.0141	N/A	N/A	120.1900	0.0226	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
1-Pentene						7.1230	N/A	N/A	70.1400	0.0019	0.0046	70.14	Option 2: A=6.8442, B=1044.01, C=233.5
2,2,4-Trimethylpentane						0.4568	N/A	N/A	114.2300	0.0134	0.0021	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
2-Methyl-1-butene						3.6877	N/A	N/A	70.1300	0.0043	0.0054	70.13	Option 2: A=6.4863, B=1039.69, C=236.65
2-Pentene						5.1474	N/A	N/A	70.1400	0.0081	0.0142	70.14	Option 1: VP50 = 5 VP60 = 6.5
Benzene						0.9046	N/A	N/A	78.1100	0.0247	0.0076	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.9439	N/A	N/A	84.1600	0.0100	0.0032	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0787	N/A	N/A	106.1700	0.0094	0.0003	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.5057	N/A	N/A	86.1700	0.0219	0.0112	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopentane						8.0970	N/A	N/A	72.1500	0.1522	0.4203	72.15	Option 1: VP50 = 7.889 VP60 = 10.005
Isopropyl benzene						0.0362	N/A	N/A	120.2000	0.0008	0.0000	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Naphthalene						0.0016	N/A	N/A	128.0000	0.0026	0.0000	128.00	Option 1: VP50 = .0015 VP60 = .0024
Pentane (-n)						5.5760	N/A	N/A	72.1500	0.0329	0.0626	72.15	Option 3: A=27691, B=7.558
Phenol						0.0052	N/A	N/A	94.0000	0.0006	0.0000	94.00	Option 1: VP50 = .005 VP60 = .007
Toluene						0.2478	N/A	N/A	92.1300	0.0532	0.0045	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.1511	N/A	N/A	61.3341	0.5626	0.4620	105.73	
Xylene (-m)						0.0654	N/A	N/A	106.1700	0.0789	0.0018	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T-3 - Internal Floating Roof Tank
Gallup, NM

Annual Emission Calcaulations

Rim Seal Losses (lb):	367.1705
Seal Factor A (lb-mole/ft-yr):	1.6000
Seal Factor B (lb-mole/ft-yr (mph)^n):	0.3000
Value of Vapor Pressure Function:	0.1142
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	4.1571
Tank Diameter (ft):	30.0000
Vapor Molecular Weight (lb/lb-mole):	67.0000
Product Factor:	1.0000
Withdrawal Losses (lb):	1,080.2290
Number of Columns:	1.0000
Effective Column Diameter (ft):	1.0000
Annual Net Throughput (gal/yr.):	160,000,000.0000
Shell Clingage Factor (bbl/1000 sqft):	0.0015
Average Organic Liquid Density (lb/gal):	5.8200
Tank Diameter (ft):	30.0000
Deck Fitting Losses (lb):	5,006.3697
Value of Vapor Pressure Function:	0.1142
Vapor Molecular Weight (lb/lb-mole):	67.0000
Product Factor:	1.0000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	654.4800
Deck Seam Losses (lb):	0.0000
Deck Seam Length (ft):	0.0000
Deck Seam Loss per Unit Length Factor (lb-mole/ft-yr):	0.0000
Deck Seam Length Factor(ft/sqft):	0.0000
Tank Diameter (ft):	30.0000
Vapor Molecular Weight (lb/lb-mole):	67.0000
Product Factor:	1.0000
Total Losses (lb):	6,453.7691

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors KFa(lb-mole/yr)	KFb(lb-mole/(yr mph^n))	m	Losses(lb)
Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed	1	36.00	5.90	1.20	275.3779
Automatic Gauge Float Well/Bolted Cover, Gasketed	1	2.80	0.00	0.00	21.4183
Sample Pipe or Well (24-in. Diam.)/Slotted Pipe-Sliding Cover, Gask.	1	43.00	0.00	0.00	328.9236
Roof Leg (3-in. Diameter)/Adjustable, Center Area, Gasketed	10	0.53	0.11	0.13	40.5417
Ladder Well (36-in Diam.)/Sliding Cover, Gasketed	10	56.00	0.00	0.00	4,283.6558
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1	0.71	0.10	1.00	5.4311
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	47.4262
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Gask.	1	0.47	0.02	0.97	3.5952

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-3 - Internal Floating Roof Tank
Gallup, NM

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Gasoline (87 Oct. Base) - Ciniza	367.17	1,080.23	5,006.37	0.00	6,453.77
Isopentane	154.34	164.41	2,104.37	0.00	2,423.12
1-Pentene	1.69	2.05	23.11	0.00	26.86
2-Methyl-1-butene	1.99	4.64	27.08	0.00	33.71
Pentane (-n)	22.97	35.54	313.26	0.00	371.77
2-Pentene	5.22	8.75	71.20	0.00	85.17
Hexane (-n)	4.13	23.66	56.31	0.00	84.10
Benzene	2.80	26.68	38.15	0.00	67.63
Cyclohexane	1.18	10.80	16.12	0.00	28.10
2,2,4-Trimethylpentane	0.77	14.48	10.45	0.00	25.69
Toluene	1.65	57.47	22.51	0.00	81.63
Ethylbenzene	0.09	10.15	1.26	0.00	11.51
Xylene (-m)	0.65	85.23	8.81	0.00	94.68
Isopropyl benzene	0.00	0.86	0.05	0.00	0.92
1,2,4-Trimethylbenzene	0.04	24.41	0.54	0.00	25.00
Naphthalene	0.00	2.81	0.01	0.00	2.82
Phenol	0.00	0.59	0.00	0.00	0.60
Unidentified Components	169.65	607.68	2,313.14	0.00	3,090.47

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T-4
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Internal Floating Roof Tank
Description:	Low-octane base gasoline

Tank Dimensions

Diameter (ft):	30.00
Volume (gallons):	168,000.00
Turnovers:	494.05
Self Supp. Roof? (y/n):	N
No. of Columns:	1.00
Eff. Col. Diam. (ft):	1.00

Paint Characteristics

Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Rim-Seal System

Primary Seal:	Liquid-mounted
Secondary Seal	None

Deck Characteristics

Deck Fitting Category:	Detail
Deck Type:	Welded

Deck Fitting/Status	Quantity
Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed	1
Automatic Gauge Float Well/Bolted Cover, Gasketed	1
Ladder Well (36-in Diam.)/Sliding Cover, Gasketed	1
Sample Pipe or Well (24-in. Diam.)/Slotted Pipe-Sliding Cover, Gask.	1
Roof Leg (3-in. Diameter)/Adjustable, Center Area, Gasketed	10
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-4 - Internal Floating Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Gasoline (83 Oct. Base) - Ciniza	All	50.98	42.67	59.29	48.62	4.1571	N/A	N/A	67.0000			93.00	Option 4: RVP=9.8, ASTM Slope=2.5
1,2,4-Trimethylbenzene						0.0141	N/A	N/A	120.1900	0.0191	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
1-Pentene						7.1230	N/A	N/A	70.1400	0.0019	0.0045	70.14	Option 2: A=6.8442, B=1044.01, C=233.5
2-Methyl-1-butene						3.6877	N/A	N/A	70.1300	0.0042	0.0052	70.13	Option 2: A=6.4863, B=1039.69, C=236.65
2-Pentene						5.1474	N/A	N/A	70.1400	0.0082	0.0141	70.14	Option 1: VP50 = 5 VP60 = 6.5
Benzene						0.9046	N/A	N/A	78.1100	0.0270	0.0082	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.9439	N/A	N/A	84.1600	0.0187	0.0059	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0787	N/A	N/A	106.1700	0.0112	0.0003	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.5057	N/A	N/A	86.1700	0.0504	0.0253	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopentane						8.0970	N/A	N/A	72.1500	0.1119	0.3025	72.15	Option 1: VP50 = 7.889 VP60 = 10.005
Isopropyl benzene						0.0362	N/A	N/A	120.2000	0.0007	0.0000	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Naphthalene						0.0016	N/A	N/A	128.0000	0.0023	0.0000	128.00	Option 1: VP50 = .0015 VP60 = .0024
Pentane (-n)						5.5760	N/A	N/A	72.1500	0.0637	0.1186	72.15	Option 3: A=27691, B=7.558
Phenol						0.0052	N/A	N/A	94.0000	0.0006	0.0000	94.00	Option 1: VP50 = .005 VP60 = .007
Toluene						0.2478	N/A	N/A	92.1300	0.0742	0.0061	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.6956	N/A	N/A	61.9378	0.5386	0.5077	103.01	
Xylene (-m)						0.0654	N/A	N/A	106.1700	0.0674	0.0015	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T-4 - Internal Floating Roof Tank
Gallup, NM

Annual Emission Calcaulations	
Rim Seal Losses (lb):	367.1705
Seal Factor A (lb-mole/ft-yr):	1.6000
Seal Factor B (lb-mole/ft-yr (mph)^n):	0.3000
Value of Vapor Pressure Function:	0.1142
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	4.1571
Tank Diameter (ft):	30.0000
Vapor Molecular Weight (lb/lb-mole):	67.0000
Product Factor:	1.0000
Withdrawal Losses (lb):	558.4431
Number of Columns:	1.0000
Effective Column Diameter (ft):	1.0000
Annual Net Throughput (gal/yr.):	83,000,000.0000
Shell Clingage Factor (bbl/1000 sqft):	0.0015
Average Organic Liquid Density (lb/gal):	5.8000
Tank Diameter (ft):	30.0000
Deck Fitting Losses (lb):	1,151.0795
Value of Vapor Pressure Function:	0.1142
Vapor Molecular Weight (lb/lb-mole):	67.0000
Product Factor:	1.0000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	150.4800
Deck Seam Losses (lb):	0.0000
Deck Seam Length (ft):	0.0000
Deck Seam Loss per Unit Length Factor (lb-mole/ft-yr):	0.0000
Deck Seam Length Factor(ft/sqft):	0.0000
Tank Diameter (ft):	30.0000
Vapor Molecular Weight (lb/lb-mole):	67.0000
Product Factor:	1.0000
Total Losses (lb):	2,076.6931

		Roof Fitting Loss Factors			
Roof Fitting/Status	Quantity	KFa(lb-mole/yr)	KFb(lb-mole/(yr mph^n))	m	Losses(lb)
Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed	1	36.00	5.90	1.20	275.3779
Automatic Gauge Float Well/Bolted Cover, Gasketed	1	2.80	0.00	0.00	21.4183
Ladder Well (36-in Diam.)/Sliding Cover, Gasketed	1	56.00	0.00	0.00	428.3656
Sample Pipe or Well (24-in. Diam.)/Slotted Pipe-Sliding Cover, Gask.	1	43.00	0.00	0.00	328.9236
Roof Leg (3-in. Diameter)/Adjustable, Center Area, Gasketed	10	0.53	0.11	0.13	40.5417
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Gask.	1	0.47	0.02	0.97	3.5952
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	47.4262
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1	0.71	0.10	1.00	5.4311

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-4 - Internal Floating Roof Tank
Gallup, NM

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Gasoline (83 Oct. Base) - Ciniza	367.17	558.44	1,151.08	0.00	2,076.69
Isopentane	111.08	62.49	348.24	0.00	521.81
1-Pentene	1.66	1.06	5.20	0.00	7.92
2-Methyl-1-butene	1.90	2.35	5.95	0.00	10.20
Pentane (-n)	43.55	35.57	136.52	0.00	215.64
2-Pentene	5.17	4.58	16.22	0.00	25.98
Hexane (-n)	9.30	28.15	29.17	0.00	66.62
Benzene	2.99	15.08	9.39	0.00	27.46
Cyclohexane	2.16	10.44	6.78	0.00	19.39
Toluene	2.25	41.44	7.07	0.00	50.76
Ethylbenzene	0.11	6.25	0.34	0.00	6.70
Xylene (-m)	0.54	37.64	1.69	0.00	39.87
Isopropyl benzene	0.00	0.39	0.01	0.00	0.40
1,2,4-Trimethylbenzene	0.03	10.67	0.10	0.00	10.80
Naphthalene	0.00	1.28	0.00	0.00	1.29
Phenol	0.00	0.31	0.00	0.00	0.31
Unidentified Components	186.41	300.75	584.39	0.00	1,071.55

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T-5
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Vertical Fixed Roof Tank
Description:	Ethanol Blendstock

Tank Dimensions

Shell Height (ft):		24.00
Diameter (ft):		25.00
Liquid Height (ft) :		21.00
Avg. Liquid Height (ft):		12.00
Volume (gallons):		77,112.08
Turnovers:		97.26
Net Throughput(gal/yr):		7,500,000.00
Is Tank Heated (y/n):	N	

Paint Characteristics

Shell Color/Shade:	Gray/Light
Shell Condition	Good
Roof Color/Shade:	Gray/Light
Roof Condition:	Good

Roof Characteristics

Type:	Cone	
Height (ft)		1.00
Slope (ft/ft) (Cone Roof)		0.08

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-5 - Vertical Fixed Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Ethanol Blendstock	All	57.39	44.50	70.27	50.84	0.6004	0.3788	0.9275	46.1000			47.60	Option 2: A=8.321, B=1718.2, C=237.5
1,2,4-Trimethylbenzene						0.0184	0.0107	0.0305	120.1900	0.0007	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
1-Pentene						8.2062	6.1463	10.7801	70.1400	0.0001	0.0014	70.14	Option 2: A=6.8442, B=1044.01, C=233.5
2-Methyl-1-butene						4.2310	3.1959	5.5147	70.1300	0.0001	0.0007	70.13	Option 2: A=6.4863, B=1039.69, C=236.65
2-Pentene						6.1082	4.5052	8.5547	70.1400	0.0002	0.0021	70.14	Option 1: VP50 = 5 VP60 = 6.5
Benzene						1.0858	0.7476	1.5425	78.1100	0.0007	0.0013	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.1282	0.7837	1.5897	84.1600	0.0011	0.0021	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0990	0.0620	0.1539	106.1700	0.0003	0.0001	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.7870	1.2595	2.4843	86.1700	0.0021	0.0065	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopentane						9.4523	6.7835	12.6067	72.1500	0.0063	0.1024	72.15	Option 1: VP50 = 7.889 VP60 = 10.005
Isopropyl benzene						0.0463	0.0279	0.0744	120.2000	0.0001	0.0000	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Pentane (-n)						6.4487	4.7951	8.5487	72.1500	0.0041	0.0455	72.15	Option 3: A=27691, B=7.558
Toluene						0.3042	0.2000	0.4512	92.1300	0.0019	0.0010	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.5446	0.5232	0.5235	43.0146	0.9808	0.8367	47.23	
Xylene (-m)						0.0824	0.0513	0.1286	106.1700	0.0015	0.0002	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T-5 - Vertical Fixed Roof Tank
Gallup, NM

Annual Emission Calcaulations	
Standing Losses (lb):	1,150.6667
Vapor Space Volume (cu ft):	6,054.1108
Vapor Density (lb/cu ft):	0.0050
Vapor Space Expansion Factor:	0.1454
Vented Vapor Saturation Factor:	0.7182
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	6,054.1108
Tank Diameter (ft):	25.0000
Vapor Space Outage (ft):	12.3333
Tank Shell Height (ft):	24.0000
Average Liquid Height (ft):	12.0000
Roof Outage (ft):	0.3333
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.3333
Roof Height (ft):	1.0000
Roof Slope (ft/ft):	0.0800
Shell Radius (ft):	12.5000
Vapor Density	
Vapor Density (lb/cu ft):	0.0050
Vapor Molecular Weight (lb/lb-mole):	46.1000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.6004
Daily Avg. Liquid Surface Temp. (deg. R):	517.0582
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	510.5100
Tank Paint Solar Absorptance (Shell):	0.5400
Tank Paint Solar Absorptance (Roof):	0.5400
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.1454
Daily Vapor Temperature Range (deg. R):	51.5419
Daily Vapor Pressure Range (psia):	0.5487
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.6004
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.3788
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.9275
Daily Avg. Liquid Surface Temp. (deg R):	517.0582
Daily Min. Liquid Surface Temp. (deg R):	504.1727
Daily Max. Liquid Surface Temp. (deg R):	529.9436
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.7182
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.6004
Vapor Space Outage (ft):	12.3333
Working Losses (lb):	2,348.1528
Vapor Molecular Weight (lb/lb-mole):	46.1000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.6004
Annual Net Throughput (gal/yr.):	7,500,000.0000
Annual Turnovers:	97.2610
Turnover Factor:	0.4751
Maximum Liquid Volume (gal):	77,112.0750
Maximum Liquid Height (ft):	21.0000
Tank Diameter (ft):	25.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	3,498.8194

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-5 - Vertical Fixed Roof Tank
Gallup, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Ethanol Blendstock	2,348.15	1,150.67	3,498.82
Cyclohexane	5.01	2.46	7.47
Toluene	2.33	1.14	3.48
Ethylbenzene	0.12	0.06	0.18
Xylene (-m)	0.50	0.24	0.74
Isopropyl benzene	0.02	0.01	0.03
1,2,4-Trimethylbenzene	0.05	0.03	0.08
Isopentane	240.49	117.85	358.34
1-Pentene	3.31	1.62	4.94
2-Methyl-1-butene	1.71	0.84	2.55
Pentane (-n)	106.78	52.32	159.10
2-Pentene	4.93	2.42	7.35
Hexane (-n)	15.15	7.43	22.58
Benzene	3.07	1.50	4.57
Unidentified Components	1,964.67	962.75	2,927.42

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T-6
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Internal Floating Roof Tank
Description:	Lt. Cat. Gasoline

Tank Dimensions

Diameter (ft):	22.00
Volume (gallons):	75,600.00
Turnovers:	6.28
Self Supp. Roof? (y/n):	Y
No. of Columns:	0.00
Eff. Col. Diam. (ft):	0.00

Paint Characteristics

Internal Shell Condition:	Light Rust
Shell Color/Shade:	Gray/Light
Shell Condition	Good
Roof Color/Shade:	Gray/Light
Roof Condition:	Good

Rim-Seal System

Primary Seal:	Mechanical Shoe
Secondary Seal	Rim-mounted

Deck Characteristics

Deck Fitting Category:	Detail
Deck Type:	Welded

Deck Fitting/Status	Quantity
Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed	1
Automatic Gauge Float Well/Bolted Cover, Gasketed	1
Roof Leg (3-in. Diameter)/Adjustable, Center Area, Gasketed	8
Sample Pipe or Well (24-in. Diam.)/Slotted Pipe-Sliding Cover, Gask.	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Ladder Well (36-in Diam.)/Sliding Cover, Gasketed	1
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-6 - Internal Floating Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Light Cat. Gasoline - Ciniza	All	57.39	44.50	70.27	50.84	3.3859	N/A	N/A	67.0000			98.00	Option 4: RVP=7.5, ASTM Slope=1.7
1,2,4-Trimethylbenzene						0.0184	N/A	N/A	120.1900	0.0159	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
1-Pentene						8.2062	N/A	N/A	70.1400	0.0105	0.0372	70.14	Option 2: A=6.8442, B=1044.01, C=233.5
2,2,4-Trimethylpentane						0.5522	N/A	N/A	114.2300	0.0022	0.0005	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
2-Methyl-1-butene						4.2310	N/A	N/A	70.1300	0.0127	0.0232	70.13	Option 2: A=6.4863, B=1039.69, C=236.65
2-Pentene						6.1082	N/A	N/A	70.1400	0.0088	0.0232	70.14	Option 1: VP50 = 5 VP60 = 6.5
Benzene						1.0858	N/A	N/A	78.1100	0.0087	0.0041	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.1282	N/A	N/A	84.1600	0.0029	0.0014	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0990	N/A	N/A	106.1700	0.0087	0.0004	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.7870	N/A	N/A	86.1700	0.0145	0.0112	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopentane						9.4523	N/A	N/A	72.1500	0.0566	0.2311	72.15	Option 1: VP50 = 7.889 VP60 = 10.005
Isopropyl benzene						0.0463	N/A	N/A	120.2000	0.0007	0.0000	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Naphthalene						0.0022	N/A	N/A	128.0000	0.0054	0.0000	128.00	Option 1: VP50 = .0015 VP60 = .0024
Pentane (-n)						6.4487	N/A	N/A	72.1500	0.0153	0.0426	72.15	Option 3: A=27691, B=7.558
Toluene						0.3042	N/A	N/A	92.1300	0.0328	0.0043	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						3.0537	N/A	N/A	64.0111	0.7542	0.6188	102.92	
Xylene (-m)						0.0824	N/A	N/A	106.1700	0.0501	0.0018	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T-6 - Internal Floating Roof Tank
Gallup, NM

Annual Emission Calcaulations	
Rim Seal Losses (lb):	78.5380
Seal Factor A (lb-mole/ft-yr):	0.6000
Seal Factor B (lb-mole/ft-yr (mph)^n):	0.4000
Value of Vapor Pressure Function:	0.0888
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	3.3859
Tank Diameter (ft):	22.0000
Vapor Molecular Weight (lb/lb-mole):	67.0000
Product Factor:	1.0000
Withdrawal Losses (lb):	4.5083
Number of Columns:	0.0000
Effective Column Diameter (ft):	0.0000
Annual Net Throughput (gal/yr.):	475,000.0000
Shell Clingage Factor (bbl/1000 sqft):	0.0015
Average Organic Liquid Density (lb/gal):	6.2000
Tank Diameter (ft):	22.0000
Deck Fitting Losses (lb):	889.0267
Value of Vapor Pressure Function:	0.0888
Vapor Molecular Weight (lb/lb-mole):	67.0000
Product Factor:	1.0000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	149.4200
Deck Seam Losses (lb):	0.0000
Deck Seam Length (ft):	0.0000
Deck Seam Loss per Unit Length Factor (lb-mole/ft-yr):	0.0000
Deck Seam Length Factor(ft/sqft):	0.0000
Tank Diameter (ft):	22.0000
Vapor Molecular Weight (lb/lb-mole):	67.0000
Product Factor:	1.0000
Total Losses (lb):	972.0730

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors KFa(lb-mole/yr)	KFb(lb-mole/(yr mph^n))	m	Losses(lb)
Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed	1	36.00	5.90	1.20	214.1946
Automatic Gauge Float Well/Bolted Cover, Gasketed	1	2.80	0.00	0.00	16.6596
Roof Leg (3-in. Diameter)/Adjustable, Center Area, Gasketed	8	0.53	0.11	0.13	25.2274
Sample Pipe or Well (24-in. Diam.)/Slotted Pipe-Sliding Cover, Gask.	1	43.00	0.00	0.00	255.8436
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	36.8891
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Gask.	1	0.47	0.02	0.97	2.7964
Ladder Well (36-in Diam.)/Sliding Cover, Gasketed	1	56.00	0.00	0.00	333.1916
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1	0.71	0.10	1.00	4.2244

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-6 - Internal Floating Roof Tank
Gallup, NM

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Light Cat. Gasoline - Ciniza	78.54	4.51	889.03	0.00	972.07
Isopentane	18.15	0.26	205.47	0.00	223.88
1-Pentene	2.92	0.05	33.09	0.00	36.06
2-Methyl-1-butene	1.82	0.06	20.64	0.00	22.52
Pentane (-n)	3.35	0.07	37.89	0.00	41.31
2-Pentene	1.82	0.04	20.64	0.00	22.51
Hexane (-n)	0.88	0.07	9.95	0.00	10.90
Benzene	0.32	0.04	3.63	0.00	3.99
Cyclohexane	0.11	0.01	1.26	0.00	1.38
2,2,4-Trimethylpentane	0.04	0.01	0.47	0.00	0.52
Toluene	0.34	0.15	3.83	0.00	4.32
Ethylbenzene	0.03	0.04	0.33	0.00	0.40
Xylene (-m)	0.14	0.23	1.59	0.00	1.95
Isopropyl benzene	0.00	0.00	0.01	0.00	0.02
1,2,4-Trimethylbenzene	0.01	0.07	0.11	0.00	0.19
Naphthalene	0.00	0.02	0.00	0.00	0.03
Unidentified Components	48.60	3.40	550.11	0.00	602.11

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	TK-7 & TK-8
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Internal Floating Roof Tank
Description:	Biodiesel Tanks

Tank Dimensions

Diameter (ft):	24.00
Volume (gallons):	84,000.00
Turnovers:	0.78
Self Supp. Roof? (y/n):	N
No. of Columns:	1.00
Eff. Col. Diam. (ft):	1.00

Paint Characteristics

Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Rim-Seal System

Primary Seal:	Liquid-mounted
Secondary Seal	None

Deck Characteristics

Deck Fitting Category:	Detail
Deck Type:	Welded

Deck Fitting/Status	Quantity
Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed	1
Automatic Gauge Float Well/Bolted Cover, Gasketed	1
Sample Pipe or Well (24-in. Diam.)/Slotted Pipe-Sliding Cover, Gask.	1
Roof Leg (3-in. Diameter)/Adjustable, Center Area, Gasketed	10
Ladder Well (36-in Diam.)/Sliding Cover, Gasketed	10
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Gask.	1

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

TK-7 & TK-8 - Internal Floating Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Gallup Biodiesel	All	50.98	42.67	59.29	48.62	0.0038	N/A	N/A	116.0000			208.00	Option 1: VP50 = .0036 VP60 = .0059
1,2,4-Trimethylbenzene						0.0141	N/A	N/A	120.1900	0.0031	0.0206	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane						0.4568	N/A	N/A	114.2300	0.0001	0.0171	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Cyclohexane						0.9439	N/A	N/A	84.1600	0.0003	0.1416	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0787	N/A	N/A	106.1700	0.0002	0.0059	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Naphthalene						0.0016	N/A	N/A	128.0000	0.0014	0.0011	128.00	Option 1: VP50 = .0015 VP60 = .0024
Toluene						0.2478	N/A	N/A	92.1300	0.0005	0.0557	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.0025	N/A	N/A	129.3172	0.9927	0.7065	209.28	
Xylene (-m)						0.0654	N/A	N/A	106.1700	0.0017	0.0515	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

TK-7 & TK-8 - Internal Floating Roof Tank
Gallup, NM

Annual Emission Calcaulations	
Rim Seal Losses (lb):	0.3771
Seal Factor A (lb-mole/ft-yr):	1.6000
Seal Factor B (lb-mole/ft-yr (mph)^n):	0.3000
Value of Vapor Pressure Function:	0.0001
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0038
Tank Diameter (ft):	24.0000
Vapor Molecular Weight (lb/lb-mole):	116.0000
Product Factor:	1.0000
Withdrawal Losses (lb):	0.6751
Number of Columns:	1.0000
Effective Column Diameter (ft):	1.0000
Annual Net Throughput (gal/yr.):	65,700.0000
Shell Clingage Factor (bbl/1000 sqft):	0.0015
Average Organic Liquid Density (lb/gal):	7.0300
Tank Diameter (ft):	24.0000
Deck Fitting Losses (lb):	6.4275
Value of Vapor Pressure Function:	0.0001
Vapor Molecular Weight (lb/lb-mole):	116.0000
Product Factor:	1.0000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	654.4800
Deck Seam Losses (lb):	0.0000
Deck Seam Length (ft):	0.0000
Deck Seam Loss per Unit Length Factor (lb-mole/ft-yr):	0.0000
Deck Seam Length Factor(ft/sqft):	0.0000
Tank Diameter (ft):	24.0000
Vapor Molecular Weight (lb/lb-mole):	116.0000
Product Factor:	1.0000
Total Losses (lb):	7.4798

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors KFa(lb-mole/yr)	KFb(lb-mole/(yr mph^n))	m	Losses(lb)
Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed	1	36.00	5.90	1.20	0.3535
Automatic Gauge Float Well/Bolted Cover, Gasketed	1	2.80	0.00	0.00	0.0275
Sample Pipe or Well (24-in. Diam.)/Slotted Pipe-Sliding Cover, Gask.	1	43.00	0.00	0.00	0.4223
Roof Leg (3-in. Diameter)/Adjustable, Center Area, Gasketed	10	0.53	0.11	0.13	0.0521
Ladder Well (36-in Diam.)/Sliding Cover, Gasketed	10	56.00	0.00	0.00	5.4996
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1	0.71	0.10	1.00	0.0070
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	0.0609
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Gask.	1	0.47	0.02	0.97	0.0046

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

TK-7 & TK-8 - Internal Floating Roof Tank
Gallup, NM

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Gallup Biodiesel	0.38	0.68	6.43	0.00	7.48
1,2,4-Trimethylbenzene	0.01	0.00	0.13	0.00	0.14
2,2,4-Trimethylpentane	0.01	0.00	0.11	0.00	0.12
Cyclohexane	0.05	0.00	0.91	0.00	0.96
Ethylbenzene	0.00	0.00	0.04	0.00	0.04
Naphthalene	0.00	0.00	0.01	0.00	0.01
Toluene	0.02	0.00	0.36	0.00	0.38
Xylene (-m)	0.02	0.00	0.33	0.00	0.35
Unidentified Components	0.27	0.67	4.54	0.00	5.48

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T-35
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Horizontal Tank
Description:	Unichem 8092

Tank Dimensions

Shell Length (ft):	9.00
Diameter (ft):	4.00
Volume (gallons):	800.00
Turnovers:	8.75
Net Throughput(gal/yr):	7,000.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	Aluminum/Diffuse
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-35 - Horizontal Tank
Gallup, NM

		Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp	Vapor Pressure (psia)			Vapor Mol.	Liquid Mass	Vapor Mass	Mol.	Basis for Vapor Pressure
Mixture/Component	Month	Avg.	Min.	Max.	(deg F)	Avg.	Min.	Max.	Weight.	Fract.	Fract.	Weight	Calculations
Unichem 8092 -Pour Pt. Depress.	All	58.43	44.80	72.05	51.20	0.0614	0.0398	0.0927	106.0000			200.00	Option 4: RVP=.2, ASTM Slope=2.5
Ethylbenzene						0.1027	0.0627	0.1632	106.1700	0.1000	0.3155	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Isopropyl benzene						0.0482	0.0283	0.0793	120.2000	0.0500	0.0740	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Naphthalene						0.0023	0.0012	0.0041	128.0000	0.0500	0.0035	128.00	Option 1: VP50 = .0015 VP60 = .0024
Unidentified Components						0.0537	0.0154	0.0197	103.8060	0.7500	0.4757	269.73	
Xylene (-m)						0.0855	0.0519	0.1364	106.1700	0.0500	0.1313	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T-35 - Horizontal Tank
Gallup, NM

Annual Emission Calcaulations

Standing Losses (lb):	3.1995
Vapor Space Volume (cu ft):	72.0365
Vapor Density (lb/cu ft):	0.0012
Vapor Space Expansion Factor:	0.1046
Vented Vapor Saturation Factor:	0.9935
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	72.0365
Tank Diameter (ft):	4.0000
Effective Diameter (ft):	6.7720
Vapor Space Outage (ft):	2.0000
Tank Shell Length (ft):	9.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0012
Vapor Molecular Weight (lb/lb-mole):	106.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0614
Daily Avg. Liquid Surface Temp. (deg. R):	518.0968
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	510.8700
Tank Paint Solar Absorptance (Shell):	0.6000
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.1046
Daily Vapor Temperature Range (deg. R):	54.5088
Daily Vapor Pressure Range (psia):	0.0529
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0614
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0398
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0927
Daily Avg. Liquid Surface Temp. (deg R):	518.0968
Daily Min. Liquid Surface Temp. (deg R):	504.4696
Daily Max. Liquid Surface Temp. (deg R):	531.7240
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9935
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0614
Vapor Space Outage (ft):	2.0000
Working Losses (lb):	1.0852
Vapor Molecular Weight (lb/lb-mole):	106.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0614
Annual Net Throughput (gal/yr.):	7,000.0000
Annual Turnovers:	8.7500
Turnover Factor:	1.0000
Tank Diameter (ft):	4.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	4.2847

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-35 - Horizontal Tank
Gallup, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Unichem 8092 -Pour Pt. Depress.	1.09	3.20	4.28
Ethylbenzene	0.34	1.01	1.35
Xylene (-m)	0.14	0.42	0.56
Naphthalene	0.00	0.01	0.01
Isopropyl benzene	0.08	0.24	0.32
Unidentified Components	0.52	1.52	2.04

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T-101
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Internal Floating Roof Tank
Description:	Crude Oil

Tank Dimensions

Diameter (ft):	110.00
Volume (gallons):	3,360,000.00
Turnovers:	73.46
Self Supp. Roof? (y/n):	N
No. of Columns:	1.00
Eff. Col. Diam. (ft):	1.00

Paint Characteristics

Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	Gray/Light
Roof Condition:	Good

Rim-Seal System

Primary Seal:	Mechanical Shoe
Secondary Seal	Rim-mounted

Deck Characteristics

Deck Fitting Category:	Detail
Deck Type:	Welded

Deck Fitting/Status	Quantity
Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed	1
Automatic Gauge Float Well/Bolted Cover, Gasketed	1
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Ladder Well (36-in. Diam.)/Sliding Cover, Gasketed	1
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Gasketed	37
Sample Pipe or Well (24-in. Diam.)/Slotted Pipe-Sliding Cover, Gask.	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-101 - Internal Floating Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Crude Oil (Four Corners Sweet)	All	54.19	43.59	64.78	49.73	4.4375	N/A	N/A	60.0000			163.00	Option 4: RVP=7.4
1,2,4-Trimethylbenzene						0.0161	N/A	N/A	120.1900	0.0046	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane						0.5026	N/A	N/A	114.2300	0.0005	0.0002	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.9917	N/A	N/A	78.1100	0.0053	0.0032	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.0327	N/A	N/A	84.1600	0.0144	0.0091	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0884	N/A	N/A	106.1700	0.0032	0.0002	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.6414	N/A	N/A	86.1700	0.0222	0.0223	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Hydrogen Sulfide						232.9525	N/A	N/A	34.0760	0.0000	0.0001	34.08	Option 1: VP50 = 225 VP60 = 244
Isopentane						8.7747	N/A	N/A	72.1500	0.0131	0.0704	72.15	Option 1: VP50 = 7.889 VP60 = 10.005
Isopropyl benzene						0.0410	N/A	N/A	120.2000	0.0006	0.0000	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Naphthalene						0.0019	N/A	N/A	128.0000	0.0011	0.0000	128.00	Option 1: VP50 = .0015 VP60 = .0024
Pentane (-n)						5.9992	N/A	N/A	72.1500	0.0188	0.0690	72.15	Option 3: A=27691, B=7.558
Phenol						0.0058	N/A	N/A	94.0000	0.0032	0.0000	94.00	Option 1: VP50 = .005 VP60 = .007
Toluene						0.2748	N/A	N/A	92.1300	0.0158	0.0027	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.8916	N/A	N/A	57.5537	0.8830	0.8222	185.10	
Xylene (-m)						0.0735	N/A	N/A	106.1700	0.0142	0.0006	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T-101 - Internal Floating Roof Tank
Gallup, NM

Annual Emission Calcaulations

Rim Seal Losses (lb):	196.4796
Seal Factor A (lb-mole/ft-yr):	0.6000
Seal Factor B (lb-mole/ft-yr (mph)^n):	0.4000
Value of Vapor Pressure Function:	0.1240
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	4.4375
Tank Diameter (ft):	110.0000
Vapor Molecular Weight (lb/lb-mole):	60.0000
Product Factor:	0.4000
Withdrawal Losses (lb):	1,936.8368
Number of Columns:	1.0000
Effective Column Diameter (ft):	1.0000
Annual Net Throughput (gal/yr.):	246,813,000.0000
Shell Clingage Factor (bbl/1000 sqft):	0.0060
Average Organic Liquid Density (lb/gal):	6.3500
Tank Diameter (ft):	110.0000
Deck Fitting Losses (lb):	575.3875
Value of Vapor Pressure Function:	0.1240
Vapor Molecular Weight (lb/lb-mole):	60.0000
Product Factor:	0.4000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	193.2800
Deck Seam Losses (lb):	0.0000
Deck Seam Length (ft):	0.0000
Deck Seam Loss per Unit Length Factor (lb-mole/ft-yr):	0.0000
Deck Seam Length Factor(ft/sqft):	0.0000
Tank Diameter (ft):	110.0000
Vapor Molecular Weight (lb/lb-mole):	60.0000
Product Factor:	0.4000
Total Losses (lb):	2,708.7039

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors KFa(lb-mole/yr)	KFb(lb-mole/(yr mph^n))	m	Losses(lb)
Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed	1	36.00	5.90	1.20	107.1707
Automatic Gauge Float Well/Bolted Cover, Gasketed	1	2.80	0.00	0.00	8.3355
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Gask.	1	0.47	0.02	0.97	1.3992
Ladder Well (36-in. Diam.)/Sliding Cover, Gasketed	1	56.00	0.00	0.00	166.7100
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Gasketed	37	1.30	0.08	0.65	143.1919
Sample Pipe or Well (24-in. Diam.)/Slotted Pipe-Sliding Cover, Gask.	1	43.00	0.00	0.00	128.0094
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	18.4572
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1	0.71	0.10	1.00	2.1136

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-101 - Internal Floating Roof Tank
Gallup, NM

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Crude Oil (Four Corners Sweet)	196.48	1,936.84	575.39	0.00	2,708.70
Isopentane	13.83	25.37	40.49	0.00	79.69
Pentane (-n)	13.57	36.41	39.73	0.00	89.71
Hexane (-n)	4.38	43.00	12.84	0.00	60.22
Benzene	0.63	10.27	1.85	0.00	12.75
Cyclohexane	1.79	27.89	5.24	0.00	34.92
2,2,4-Trimethylpentane	0.03	0.97	0.09	0.00	1.09
Toluene	0.52	30.60	1.53	0.00	32.65
Ethylbenzene	0.03	6.20	0.10	0.00	6.33
Xylene (-m)	0.13	27.50	0.37	0.00	28.00
Isopropyl benzene	0.00	1.16	0.01	0.00	1.17
1,2,4-Trimethylbenzene	0.01	8.91	0.03	0.00	8.94
Naphthalene	0.00	2.13	0.00	0.00	2.13
Phenol	0.00	6.26	0.01	0.00	6.26
Hydrogen Sulfide	0.01	0.00	0.04	0.00	0.06
Unidentified Components	161.54	1,710.17	473.07	0.00	2,344.78

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T-102
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	External Floating Roof Tank
Description:	Crude Oil

Tank Dimensions

Diameter (ft):	110.00
Volume (gallons):	3,360,000.00
Turnovers:	73.46

Paint Characteristics

Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition	Good

Roof Characteristics

Type:	Double Deck
Fitting Category	Detail

Tank Construction and Rim-Seal System

Construction:	Welded
Primary Seal:	Mechanical Shoe
Secondary Seal	Rim-mounted

Deck Fitting/Status	**Quantity**
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1
Automatic Gauge Float Well/Bolted Cover, Gasketed	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Unslotted Guide-Pole Well/Gasketed Sliding Cover	1
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Gasketed	18
Roof Leg (3-in. Diameter)/Adjustable, Center Area, Gasketed	20
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-102 - External Floating Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Crude Oil (Four Corners Sweet)	All	50.98	42.67	59.29	48.62	4.1836	N/A	N/A	60.0000			163.00	Option 4: RVP=7.4
1,2,4-Trimethylbenzene						0.0141	N/A	N/A	120.1900	0.0046	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane						0.4568	N/A	N/A	114.2300	0.0005	0.0001	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.9046	N/A	N/A	78.1100	0.0053	0.0031	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.9439	N/A	N/A	84.1600	0.0144	0.0088	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0787	N/A	N/A	106.1700	0.0032	0.0002	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.5057	N/A	N/A	86.1700	0.0222	0.0217	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Hydrogen Sulfide						226.8676	N/A	N/A	34.0760	0.0000	0.0001	34.08	Option 1: VP50 = 225 VP60 = 244
Isopentane						8.0970	N/A	N/A	72.1500	0.0131	0.0689	72.15	Option 1: VP50 = 7.889 VP60 = 10.005
Isopropyl benzene						0.0362	N/A	N/A	120.2000	0.0006	0.0000	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Naphthalene						0.0016	N/A	N/A	128.0000	0.0011	0.0000	128.00	Option 1: VP50 = .0015 VP60 = .0024
Pentane (-n)						5.5760	N/A	N/A	72.1500	0.0188	0.0681	72.15	Option 3: A=27691, B=7.558
Phenol						0.0052	N/A	N/A	94.0000	0.0032	0.0000	94.00	Option 1: VP50 = .005 VP60 = .007
Toluene						0.2478	N/A	N/A	92.1300	0.0158	0.0025	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.6271	N/A	N/A	57.6155	0.8830	0.8258	185.10	
Xylene (-m)						0.0654	N/A	N/A	106.1700	0.0142	0.0006	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T-102 - External Floating Roof Tank
Gallup, NM

Annual Emission Calcaulations	
Rim Seal Losses (lb):	1,616.3881
Seal Factor A (lb-mole/ft-yr):	0.6000
Seal Factor B (lb-mole/ft-yr (mph)^n):	0.4000
Average Wind Speed (mph):	11.8000
Seal-related Wind Speed Exponent:	1.0000
Value of Vapor Pressure Function:	0.1151
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	4.1836
Tank Diameter (ft):	110.0000
Vapor Molecular Weight (lb/lb-mole):	60.0000
Product Factor:	0.4000
Withdrawal Losses (lb):	1,919.3878
Annual Net Throughput (gal/yr.):	246,813,000.0000
Shell Clingage Factor (bbl/1000 sqft):	0.0060
Average Organic Liquid Density (lb/gal):	6.3500
Tank Diameter (ft):	110.0000
Roof Fitting Losses (lb):	3,983.1712
Value of Vapor Pressure Function:	0.1151
Vapor Molecular Weight (lb/lb-mole):	60.0000
Product Factor:	0.4000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	1,442.0744
Average Wind Speed (mph):	11.8000
Total Losses (lb):	7,518.9470

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors KFa(lb-mole/yr)	KFb(lb-mole/(yr mph^n))	m	Losses(lb)
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1	1.60	0.00	0.00	4.4194
Automatic Gauge Float Well/Bolted Cover, Gasketed	1	2.80	0.00	0.00	7.7339
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	41.2455
Unslotted Guide-Pole Well/Gasketed Sliding Cover	1	25.00	13.00	2.20	3,806.2049
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Gask.	1	0.47	0.02	0.97	1.7265
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Gasketed	18	1.30	0.08	0.65	80.3241
Roof Leg (3-in. Diameter)/Adjustable, Center Area, Gasketed	20	0.53	0.11	0.13	37.2744
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1	0.71	0.10	1.00	4.2426

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-102 - External Floating Roof Tank
Gallup, NM

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Crude Oil (Four Corners Sweet)	1,616.39	1,919.39	3,983.17	0.00	7,518.95
Isopentane	111.33	25.14	274.35	0.00	410.83
Pentane (-n)	110.03	36.08	271.14	0.00	417.25
Hexane (-n)	35.09	42.61	86.46	0.00	164.16
Benzene	5.03	10.17	12.40	0.00	27.60
Cyclohexane	14.27	27.64	35.16	0.00	77.06
Xylene (-m)	0.97	27.26	2.40	0.00	30.63
Isopropyl benzene	0.02	1.15	0.06	0.00	1.23
1,2,4-Trimethylbenzene	0.07	8.83	0.17	0.00	9.07
Naphthalene	0.00	2.11	0.00	0.00	2.12
Phenol	0.02	6.20	0.04	0.00	6.26
Hydrogen Sulfide	0.12	0.00	0.29	0.00	0.41
Unidentified Components	1,334.82	1,694.76	3,289.32	0.00	6,318.91
2,2,4-Trimethylpentane	0.24	0.96	0.59	0.00	1.79
Toluene	4.11	30.33	10.13	0.00	44.56
Ethylbenzene	0.26	6.14	0.65	0.00	7.06

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T-105
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Vertical Fixed Roof Tank
Description:	Recovered oil

Tank Dimensions

Shell Height (ft):	15.00
Diameter (ft):	11.00
Liquid Height (ft) :	15.00
Avg. Liquid Height (ft):	7.50
Volume (gallons):	10,668.00
Turnovers:	131.23
Net Throughput(gal/yr):	1,400,000.00
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Light
Shell Condition	Good
Roof Color/Shade:	Gray/Light
Roof Condition:	Good

Roof Characteristics

Type:	Cone
Height (ft)	0.50
Slope (ft/ft) (Cone Roof)	0.09

Breather Vent Settings

Vacuum Settings (psig):	0.00
Pressure Settings (psig)	0.00

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-105 - Vertical Fixed Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Recovered Oil - Ciniza	All	57.39	44.50	70.27	50.84	0.7478	0.4901	1.1082	105.0000			184.00	Option 1: VP50 = .6 VP60 = .8
1,2,4-Trimethylbenzene						0.0184	0.0107	0.0305	120.1900	0.0114	0.0005	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane						0.5522	0.3747	0.7954	114.2300	0.0064	0.0083	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
2-Methyl-1-butene						4.2310	3.1959	5.5147	70.1300	0.0016	0.0159	70.13	Option 2: A=6.4863, B=1039.69, C=236.65
Benzene						1.0858	0.7476	1.5425	78.1100	0.0057	0.0145	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.1282	0.7837	1.5897	84.1600	0.0066	0.0174	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0990	0.0620	0.1539	106.1700	0.0051	0.0012	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.7870	1.2595	2.4843	86.1700	0.0100	0.0419	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopentane						9.4523	6.7835	12.6067	72.1500	0.0195	0.4320	72.15	Option 1: VP50 = 7.889 VP60 = 10.005
Isopropyl benzene						0.0463	0.0279	0.0744	120.2000	0.0006	0.0001	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Naphtha						0.5428	0.3816	0.7590	108.0000	0.8695	1.1061	108.00	Option 4: RVP=1.5, ASTM Slope=1.5
Naphthalene						0.0022	0.0012	0.0037	128.0000	0.0024	0.0000	128.00	Option 1: VP50 = .0015 VP60 = .0024
Pentane (-n)						6.4487	4.7951	8.5487	72.1500	0.0094	0.1421	72.15	Option 3: A=27691, B=7.558
Toluene						0.3042	0.2000	0.4512	92.1300	0.0242	0.0173	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Xylene (-m)						0.0824	0.0513	0.1286	106.1700	0.0276	0.0053	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T-105 - Vertical Fixed Roof Tank
Gallup, NM

Annual Emission Calcaulations

Standing Losses (lb):	456.7775
Vapor Space Volume (cu ft):	728.5877
Vapor Density (lb/cu ft):	0.0142
Vapor Space Expansion Factor:	0.1583
Vented Vapor Saturation Factor:	0.7670
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	728.5877
Tank Diameter (ft):	11.0000
Vapor Space Outage (ft):	7.6667
Tank Shell Height (ft):	15.0000
Average Liquid Height (ft):	7.5000
Roof Outage (ft):	0.1667
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.1667
Roof Height (ft):	0.5000
Roof Slope (ft/ft):	0.0909
Shell Radius (ft):	5.5000
Vapor Density	
Vapor Density (lb/cu ft):	0.0142
Vapor Molecular Weight (lb/lb-mole):	105.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.7478
Daily Avg. Liquid Surface Temp. (deg. R):	517.0582
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	510.5100
Tank Paint Solar Absorptance (Shell):	0.5400
Tank Paint Solar Absorptance (Roof):	0.5400
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.1583
Daily Vapor Temperature Range (deg. R):	51.5419
Daily Vapor Pressure Range (psia):	0.6182
Breather Vent Press. Setting Range(psia):	0.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.7478
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.4901
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	1.1082
Daily Avg. Liquid Surface Temp. (deg R):	517.0582
Daily Min. Liquid Surface Temp. (deg R):	504.1727
Daily Max. Liquid Surface Temp. (deg R):	529.9436
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.7670
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.7478
Vapor Space Outage (ft):	7.6667
Working Losses (lb):	775.8603
Vapor Molecular Weight (lb/lb-mole):	105.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.7478
Annual Net Throughput (gal/yr.):	1,400,000.0000
Annual Turnovers:	131.2336
Turnover Factor:	0.3953
Maximum Liquid Volume (gal):	10,668.0000
Maximum Liquid Height (ft):	15.0000
Tank Diameter (ft):	11.0000
Working Loss Product Factor:	0.7500
Total Losses (lb):	1,232.6378

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-105 - Vertical Fixed Roof Tank
Gallup, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Recovered Oil - Ciniza	775.86	456.78	1,232.64
Isopentane	335.14	197.31	532.44
2-Methyl-1-butene	12.31	7.25	19.56
Pentane (-n)	110.22	64.89	175.11
Hexane (-n)	32.49	19.13	51.62
Benzene	11.25	6.62	17.88
Cyclohexane	13.54	7.97	21.51
2,2,4-Trimethylpentane	6.43	3.78	10.21
Toluene	13.39	7.88	21.27
Ethylbenzene	0.92	0.54	1.46
Xylene (-m)	4.14	2.43	6.57
1,2,4-Trimethylbenzene	0.38	0.22	0.61
Naphthalene	0.01	0.01	0.02
Isopropyl benzene	0.05	0.03	0.08
Naphtha	858.17	505.24	1,363.41

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T-106
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Vertical Fixed Roof Tank
Description:	Diesel

Tank Dimensions

Shell Height (ft):	32.00
Diameter (ft):	33.50
Liquid Height (ft) :	32.00
Avg. Liquid Height (ft):	16.00
Volume (gallons):	210,000.00
Turnovers:	23.81
Net Throughput(gal/yr):	5,000,000.00
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Roof Characteristics

Type:	Cone
Height (ft)	1.00
Slope (ft/ft) (Cone Roof)	0.06

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-106 - Vertical Fixed Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Diesel #2 - Ciniza	All	50.98	42.67	59.29	48.62	0.0048	0.0035	0.0072	130.0000			217.00	Option 1: VP50 = .0045 VP60 = .0074
1,2,4-Trimethylbenzene						0.0141	0.0099	0.0199	120.1900	0.0039	0.0192	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane						0.4568	0.3539	0.5837	114.2300	0.0001	0.0159	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Cyclohexane						0.9439	0.7428	1.1885	84.1600	0.0004	0.1317	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0787	0.0578	0.1059	106.1700	0.0002	0.0055	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Isopropyl benzene						0.0362	0.0259	0.0498	120.2000	0.0001	0.0013	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Naphthalene						0.0016	0.0011	0.0023	128.0000	0.0018	0.0010	128.00	Option 1: VP50 = .0015 VP60 = .0024
Toluene						0.2478	0.1881	0.3230	92.1300	0.0006	0.0519	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.0030	0.0025	0.0025	152.9611	0.9908	0.7256	218.86	
Xylene (-m)						0.0654	0.0479	0.0882	106.1700	0.0021	0.0479	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T-106 - Vertical Fixed Roof Tank
Gallup, NM

Annual Emission Calcaulations

Standing Losses (lb):	35.7153
Vapor Space Volume (cu ft):	14,396.4138
Vapor Density (lb/cu ft):	0.0001
Vapor Space Expansion Factor:	0.0601
Vented Vapor Saturation Factor:	0.9959
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	14,396.4138
Tank Diameter (ft):	33.5000
Vapor Space Outage (ft):	16.3333
Tank Shell Height (ft):	32.0000
Average Liquid Height (ft):	16.0000
Roof Outage (ft):	0.3333
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.3333
Roof Height (ft):	1.0000
Roof Slope (ft/ft):	0.0600
Shell Radius (ft):	16.7500
Vapor Density	
Vapor Density (lb/cu ft):	0.0001
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0048
Daily Avg. Liquid Surface Temp. (deg. R):	510.6529
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	508.2900
Tank Paint Solar Absorptance (Shell):	0.1700
Tank Paint Solar Absorptance (Roof):	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0601
Daily Vapor Temperature Range (deg. R):	33.2462
Daily Vapor Pressure Range (psia):	0.0037
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0048
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0035
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0072
Daily Avg. Liquid Surface Temp. (deg R):	510.6529
Daily Min. Liquid Surface Temp. (deg R):	502.3414
Daily Max. Liquid Surface Temp. (deg R):	518.9645
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9959
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0048
Vapor Space Outage (ft):	16.3333
Working Losses (lb):	74.0544
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0048
Annual Net Throughput (gal/yr.):	5,000,000.0000
Annual Turnovers:	23.8095
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	210,000.0000
Maximum Liquid Height (ft):	32.0000
Tank Diameter (ft):	33.5000
Working Loss Product Factor:	1.0000
Total Losses (lb):	109.7697

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-106 - Vertical Fixed Roof Tank
Gallup, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Diesel #2 - Ciniza	74.05	35.72	109.77
Cyclohexane	9.75	4.70	14.46
2,2,4-Trimethylpentane	1.18	0.57	1.75
Toluene	3.84	1.85	5.69
Ethylbenzene	0.41	0.20	0.60
Xylene (-m)	3.55	1.71	5.26
Isopropyl benzene	0.09	0.05	0.14
1,2,4-Trimethylbenzene	1.42	0.69	2.11
Naphthalene	0.07	0.04	0.11
Unidentified Components	53.74	25.92	79.65

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T-107 (IFR)
City:	Gallup
State:	New Mexico
Company:	Western Refining Southwest, Inc.
Type of Tank:	Internal Floating Roof Tank
Description:	Internal floating roof tank

Tank Dimensions

Diameter (ft):	33.50
Volume (gallons):	210,000.00
Turnovers:	6.67
Self Supp. Roof? (y/n):	N
No. of Columns:	1.00
Eff. Col. Diam. (ft):	1.00

Paint Characteristics

Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Rim-Seal System

Primary Seal:	Mechanical Shoe
Secondary Seal	Rim-mounted

Deck Characteristics

Deck Fitting Category:	Detail
Deck Type:	Welded

Deck Fitting/Status	Quantity
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1
Automatic Gauge Float Well/Bolted Cover, Gasketed	1
Roof Leg (3-in. Diameter)/Adjustable, Center Area, Gasketed	11
Sample Pipe or Well (24-in. Diam.)/Slotted Pipe-Sliding Cover, Gask.	1
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Ladder Well (36-in Diam.)/Sliding Cover, Gasketed	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-107 (IFR) - Internal Floating Roof Tank
Gallup, New Mexico

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Gasoline (83 Oct. Base) - Ciniza	All	50.98	42.67	59.29	48.62	4.1571	N/A	N/A	67.0000			93.00	Option 4: RVP=9.8, ASTM Slope=2.5
1,2,4-Trimethylbenzene						0.0141	N/A	N/A	120.1900	0.0250	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Benzene						0.9046	N/A	N/A	78.1100	0.0180	0.0054	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.9439	N/A	N/A	84.1600	0.0024	0.0008	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0787	N/A	N/A	106.1700	0.0140	0.0004	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.5057	N/A	N/A	86.1700	0.0100	0.0050	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isooctane						0.4060	N/A	N/A	114.2200	0.0400	0.0054	114.22	Option 1: VP50 = .387 VP60 = .58
Isopropyl benzene						0.0362	N/A	N/A	120.2000	0.0050	0.0001	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Toluene						0.2478	N/A	N/A	92.1300	0.0700	0.0058	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						5.3363	N/A	N/A	66.5466	0.7456	0.9755	90.63	
Xylene (-m)						0.0654	N/A	N/A	106.1700	0.0700	0.0015	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d

Emissions Report - Detail Format
Detail Calculations (AP-42)

T-107 (IFR) - Internal Floating Roof Tank
Gallup, New Mexico

Annual Emission Calcaulations	
Rim Seal Losses (lb):	153.7526
Seal Factor A (lb-mole/ft-yr):	0.6000
Seal Factor B (lb-mole/ft-yr (mph)^n):	0.4000
Value of Vapor Pressure Function:	0.1142
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	4.1571
Tank Diameter (ft):	33.5000
Vapor Molecular Weight (lb/lb-mole):	67.0000
Product Factor:	1.0000
Withdrawal Losses (lb):	8.4070
Number of Columns:	1.0000
Effective Column Diameter (ft):	1.0000
Annual Net Throughput (gal/yr.):	1,400,000.0000
Shell Clingage Factor (bbl/1000 sqft):	0.0015
Average Organic Liquid Density (lb/gal):	5.8000
Tank Diameter (ft):	33.5000
Deck Fitting Losses (lb):	891.9948
Value of Vapor Pressure Function:	0.1142
Vapor Molecular Weight (lb/lb-mole):	67.0000
Product Factor:	1.0000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	116.6100
Deck Seam Losses (lb):	0.0000
Deck Seam Length (ft):	0.0000
Deck Seam Loss per Unit Length Factor (lb-mole/ft-yr):	0.0000
Deck Seam Length Factor(ft/sqft):	0.0000
Tank Diameter (ft):	33.5000
Vapor Molecular Weight (lb/lb-mole):	67.0000
Product Factor:	1.0000
Total Losses (lb):	1,054.1544

0.53 tpy

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors KFa(lb-mole/yr)	KFb(lb-mole/(yr mph^n))	m	Losses(lb)
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1	1.60	0.00	0.00	12.2390
Automatic Gauge Float Well/Bolted Cover, Gasketed	1	2.80	0.00	0.00	21.4183
Roof Leg (3-in. Diameter)/Adjustable, Center Area, Gasketed	11	0.53	0.11	0.13	44.5959
Sample Pipe or Well (24-in. Diam.)/Slotted Pipe-Sliding Cover, Gask.	1	43.00	0.00	0.00	328.9236
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Gask.	1	0.47	0.02	0.97	3.5952
Ladder Well (36-in Diam.)/Sliding Cover, Gasketed	1	56.00	0.00	0.00	428.3656
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	47.4262
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1	0.71	0.10	1.00	5.4311

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-107 (IFR) - Internal Floating Roof Tank
Gallup, New Mexico

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Gasoline (83 Oct. Base) - Ciniza	153.75	8.41	891.99	0.00	1,054.15
Hexane (-n)	0.77	0.08	4.48	0.00	5.34
Benzene	0.84	0.15	4.85	0.00	5.84
Isooctane	0.83	0.34	4.84	0.00	6.01
Toluene	0.89	0.59	5.17	0.00	6.65
Ethylbenzene	0.06	0.12	0.33	0.00	0.50
Xylene (-m)	0.23	0.59	1.36	0.00	2.19
Isopropyl benzene	0.01	0.04	0.05	0.00	0.11
1,2,4-Trimethylbenzene	0.02	0.21	0.11	0.00	0.33
Cyclohexane	0.12	0.02	0.67	0.00	0.81
Unidentified Components	149.98	6.27	870.13	0.00	1,026.39

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T-108
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Internal Floating Roof Tank
Description:	Alkylate

Tank Dimensions

Diameter (ft):	33.50
Volume (gallons):	210,000.00
Turnovers:	152.38
Self Supp. Roof? (y/n):	N
No. of Columns:	1.00
Eff. Col. Diam. (ft):	1.00

Paint Characteristics

Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Rim-Seal System

Primary Seal:	Mechanical Shoe
Secondary Seal	Rim-mounted

Deck Characteristics

Deck Fitting Category:	Detail
Deck Type:	Welded

Deck Fitting/Status	Quantity
Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed	1
Automatic Gauge Float Well/Bolted Cover, Gasketed	1
Roof Leg (3-in. Diameter)/Adjustable, Center Area, Gasketed	11
Sample Pipe or Well (24-in. Diam.)/Slotted Pipe-Sliding Cover, Gask.	1
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Ladder Well (36-in Diam.)/Sliding Cover, Gasketed	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-108 - Internal Floating Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Alkylate	All	50.98	42.67	59.29	48.62	3.1882	N/A	N/A	75.0000			103.00	Option 4: RVP=7.5, ASTM Slope=3.5
2,2,4-Trimethylpentane						0.4568	N/A	N/A	114.2300	0.1460	0.0287	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Ethylbenzene						0.0787	N/A	N/A	106.1700	0.0002	0.0000	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Isopentane						8.0970	N/A	N/A	72.1500	0.0842	0.2937	72.15	Option 1: VP50 = 7.889 VP60 = 10.005
Pentane (-n)						5.5760	N/A	N/A	72.1500	0.0073	0.0175	72.15	Option 3: A=27691, B=7.558
Toluene						0.2478	N/A	N/A	92.1300	0.0299	0.0032	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						2.9660	N/A	N/A	75.2097	0.7324	0.6569	107.14	

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T-108 - Internal Floating Roof Tank
Gallup, NM

Annual Emission Calcaulations

Rim Seal Losses (lb):	124.6432
Seal Factor A (lb-mole/ft-yr):	0.6000
Seal Factor B (lb-mole/ft-yr (mph)^n):	0.4000
Value of Vapor Pressure Function:	0.0827
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	3.1882
Tank Diameter (ft):	33.5000
Vapor Molecular Weight (lb/lb-mole):	75.0000
Product Factor:	1.0000
Withdrawal Losses (lb):	195.4723
Number of Columns:	1.0000
Effective Column Diameter (ft):	1.0000
Annual Net Throughput (gal/yr.):	32,000,000.0000
Shell Clingage Factor (bbl/1000 sqft):	0.0015
Average Organic Liquid Density (lb/gal):	5.9000
Tank Diameter (ft):	33.5000
Deck Fitting Losses (lb):	936.4365
Value of Vapor Pressure Function:	0.0827
Vapor Molecular Weight (lb/lb-mole):	75.0000
Product Factor:	1.0000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	151.0100
Deck Seam Losses (lb):	0.0000
Deck Seam Length (ft):	0.0000
Deck Seam Loss per Unit Length Factor (lb-mole/ft-yr):	0.0000
Deck Seam Length Factor(ft/sqft):	0.0000
Tank Diameter (ft):	33.5000
Vapor Molecular Weight (lb/lb-mole):	75.0000
Product Factor:	1.0000
Total Losses (lb):	1,256.5520

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors KFa(lb-mole/yr)	KFb(lb-mole/(yr mph^n))	m	Losses(lb)
Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed	1	36.00	5.90	1.20	223.2416
Automatic Gauge Float Well/Bolted Cover, Gasketed	1	2.80	0.00	0.00	17.3632
Roof Leg (3-in. Diameter)/Adjustable, Center Area, Gasketed	11	0.53	0.11	0.13	36.1527
Sample Pipe or Well (24-in. Diam.)/Slotted Pipe-Sliding Cover, Gask.	1	43.00	0.00	0.00	266.6497
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Gask.	1	0.47	0.02	0.97	2.9145
Ladder Well (36-in Diam.)/Sliding Cover, Gasketed	1	56.00	0.00	0.00	347.2647
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	38.4472
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1	0.71	0.10	1.00	4.4028

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-108 - Internal Floating Roof Tank
Gallup, NM

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Alkylate	124.64	195.47	936.44	0.00	1,256.55
Isopentane	36.60	16.46	275.01	0.00	328.07
Pentane (-n)	2.19	1.43	16.42	0.00	20.03
2,2,4-Trimethylpentane	3.58	28.54	26.90	0.00	59.02
Toluene	0.40	5.84	2.99	0.00	9.23
Ethylbenzene	0.00	0.04	0.01	0.00	0.05
Unidentified Components	81.87	143.16	615.11	0.00	840.15

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T-111
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Vertical Fixed Roof Tank
Description:	ultra low sulfur diesel

Tank Dimensions

Shell Height (ft):	32.00
Diameter (ft):	33.50
Liquid Height (ft) :	32.00
Avg. Liquid Height (ft):	16.00
Volume (gallons):	210,000.00
Turnovers:	65.71
Net Throughput(gal/yr):	13,800,000.00
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Roof Characteristics

Type:	Dome
Height (ft)	1.00
Radius (ft) (Dome Roof)	33.50

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-111 - Vertical Fixed Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Diesel #2 - Ciniza	All	50.98	42.67	59.29	48.62	0.0048	0.0035	0.0072	130.0000			217.00	Option 1: VP50 = .0045 VP60 = .0074
1,2,4-Trimethylbenzene						0.0141	0.0099	0.0199	120.1900	0.0039	0.0192	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane						0.4568	0.3539	0.5837	114.2300	0.0001	0.0159	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Cyclohexane						0.9439	0.7428	1.1885	84.1600	0.0004	0.1317	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0787	0.0578	0.1059	106.1700	0.0002	0.0055	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Isopropyl benzene						0.0362	0.0259	0.0498	120.2000	0.0001	0.0013	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Naphthalene						0.0016	0.0011	0.0023	128.0000	0.0018	0.0010	128.00	Option 1: VP50 = .0015 VP60 = .0024
Toluene						0.2478	0.1881	0.3230	92.1300	0.0006	0.0519	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.0030	0.0025	0.0025	152.9611	0.9908	0.7256	218.86	
Xylene (-m)						0.0654	0.0479	0.0882	106.1700	0.0021	0.0479	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T-111 - Vertical Fixed Roof Tank
Gallup, NM

Annual Emission Calcaulations

Standing Losses (lb):	36.0795
Vapor Space Volume (cu ft):	14,543.8395
Vapor Density (lb/cu ft):	0.0001
Vapor Space Expansion Factor:	0.0601
Vented Vapor Saturation Factor:	0.9958
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	14,543.8395
Tank Diameter (ft):	33.5000
Vapor Space Outage (ft):	16.5006
Tank Shell Height (ft):	32.0000
Average Liquid Height (ft):	16.0000
Roof Outage (ft):	0.5006
Roof Outage (Dome Roof)	
Roof Outage (ft):	0.5006
Dome Radius (ft):	33.5000
Shell Radius (ft):	16.7500
Vapor Density	
Vapor Density (lb/cu ft):	0.0001
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0048
Daily Avg. Liquid Surface Temp. (deg. R):	510.6529
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	508.2900
Tank Paint Solar Absorptance (Shell):	0.1700
Tank Paint Solar Absorptance (Roof):	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0601
Daily Vapor Temperature Range (deg. R):	33.2462
Daily Vapor Pressure Range (psia):	0.0037
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0048
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0035
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0072
Daily Avg. Liquid Surface Temp. (deg R):	510.6529
Daily Min. Liquid Surface Temp. (deg R):	502.3414
Daily Max. Liquid Surface Temp. (deg R):	518.9645
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9958
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0048
Vapor Space Outage (ft):	16.5006
Working Losses (lb):	127.3735
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0048
Annual Net Throughput (gal/yr.):	13,800,000.0000
Annual Turnovers:	65.7143
Turnover Factor:	0.6232
Maximum Liquid Volume (gal):	210,000.0000
Maximum Liquid Height (ft):	32.0000
Tank Diameter (ft):	33.5000
Working Loss Product Factor:	1.0000
Total Losses (lb):	163.4530

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-111 - Vertical Fixed Roof Tank
Gallup, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Diesel #2 - Ciniza	127.37	36.08	163.45
Cyclohexane	16.78	4.75	21.53
2,2,4-Trimethylpentane	2.03	0.57	2.60
Toluene	6.61	1.87	8.48
Ethylbenzene	0.70	0.20	0.90
Xylene (-m)	6.10	1.73	7.83
Isopropyl benzene	0.16	0.05	0.21
1,2,4-Trimethylbenzene	2.45	0.69	3.14
Naphthalene	0.13	0.04	0.16
Unidentified Components	92.43	26.18	118.61

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T-112
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Vertical Fixed Roof Tank
Description:	ultra low sulfur diesel

Tank Dimensions

Shell Height (ft):	32.00
Diameter (ft):	33.50
Liquid Height (ft) :	32.00
Avg. Liquid Height (ft):	16.00
Volume (gallons):	210,000.00
Turnovers:	65.71
Net Throughput(gal/yr):	13,800,000.00
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Light
Shell Condition	Good
Roof Color/Shade:	Gray/Light
Roof Condition:	Good

Roof Characteristics

Type:	Dome
Height (ft)	1.00
Radius (ft) (Dome Roof)	33.50

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-112 - Vertical Fixed Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Diesel #2 - Ciniza	All	57.39	44.50	70.27	50.84	0.0066	0.0037	0.0091	130.0000			217.00	Option 1: VP50 = .0045 VP60 = .0074
1,2,4-Trimethylbenzene						0.0184	0.0107	0.0305	120.1900	0.0039	0.0180	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane						0.5522	0.3747	0.7954	114.2300	0.0001	0.0139	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Cyclohexane						1.1282	0.7837	1.5897	84.1600	0.0004	0.1134	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0990	0.0620	0.1539	106.1700	0.0002	0.0050	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Isopropyl benzene						0.0463	0.0279	0.0744	120.2000	0.0001	0.0012	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Naphthalene						0.0022	0.0012	0.0037	128.0000	0.0018	0.0010	128.00	Option 1: VP50 = .0015 VP60 = .0024
Toluene						0.3042	0.2000	0.4512	92.1300	0.0006	0.0459	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.0045	0.0034	0.0034	148.6199	0.9908	0.7582	218.86	
Xylene (-m)						0.0824	0.0513	0.1286	106.1700	0.0021	0.0435	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T-112 - Vertical Fixed Roof Tank
Gallup, NM

Annual Emission Calcaulations

Standing Losses (lb):	77.9051
Vapor Space Volume (cu ft):	14,543.8395
Vapor Density (lb/cu ft):	0.0002
Vapor Space Expansion Factor:	0.0948
Vented Vapor Saturation Factor:	0.9942
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	14,543.8395
Tank Diameter (ft):	33.5000
Vapor Space Outage (ft):	16.5006
Tank Shell Height (ft):	32.0000
Average Liquid Height (ft):	16.0000
Roof Outage (ft):	0.5006
Roof Outage (Dome Roof)	
Roof Outage (ft):	0.5006
Dome Radius (ft):	33.5000
Shell Radius (ft):	16.7500
Vapor Density	
Vapor Density (lb/cu ft):	0.0002
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0066
Daily Avg. Liquid Surface Temp. (deg. R):	517.0582
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	510.5100
Tank Paint Solar Absorptance (Shell):	0.5400
Tank Paint Solar Absorptance (Roof):	0.5400
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0948
Daily Vapor Temperature Range (deg. R):	51.5419
Daily Vapor Pressure Range (psia):	0.0054
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0066
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0037
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0091
Daily Avg. Liquid Surface Temp. (deg R):	517.0582
Daily Min. Liquid Surface Temp. (deg R):	504.1727
Daily Max. Liquid Surface Temp. (deg R):	529.9436
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9942
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0066
Vapor Space Outage (ft):	16.5006
Working Losses (lb):	176.8188
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0066
Annual Net Throughput (gal/yr.):	13,800,000.0000
Annual Turnovers:	65.7143
Turnover Factor:	0.6232
Maximum Liquid Volume (gal):	210,000.0000
Maximum Liquid Height (ft):	32.0000
Tank Diameter (ft):	33.5000
Working Loss Product Factor:	1.0000
Total Losses (lb):	254.7239

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-112 - Vertical Fixed Roof Tank
Gallup, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Diesel #2 - Ciniza	176.82	77.91	254.72
Cyclohexane	20.05	8.83	28.89
2,2,4-Trimethylpentane	2.45	1.08	3.53
Toluene	8.11	3.57	11.68
Ethylbenzene	0.88	0.39	1.27
Xylene (-m)	7.69	3.39	11.08
Isopropyl benzene	0.21	0.09	0.30
1,2,4-Trimethylbenzene	3.19	1.40	4.59
Naphthalene	0.17	0.08	0.25
Unidentified Components	134.07	59.07	193.14

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T-115
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Vertical Fixed Roof Tank
Description:	Distillate

Tank Dimensions

Shell Height (ft):	32.00
Diameter (ft):	33.50
Liquid Height (ft) :	32.00
Avg. Liquid Height (ft):	16.00
Volume (gallons):	210,000.00
Turnovers:	150.95
Net Throughput(gal/yr):	31,700,000.00
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Light
Shell Condition	Good
Roof Color/Shade:	Gray/Light
Roof Condition:	Good

Roof Characteristics

Type:	Cone
Height (ft)	1.00
Slope (ft/ft) (Cone Roof)	0.06

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-115 - Vertical Fixed Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Distillate - Ciniza	All	57.39	44.50	70.27	50.84	0.0066	0.0037	0.0091	130.0000			230.00	Option 1: VP50 = .0045 VP60 = .0074
1,2,4-Trimethylbenzene						0.0184	0.0107	0.0305	120.1900	0.0009	0.0044	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane						0.5522	0.3747	0.7954	114.2300	0.0022	0.3236	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Ethylbenzene						0.0990	0.0620	0.1539	106.1700	0.0001	0.0026	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Naphthalene						0.0022	0.0012	0.0037	128.0000	0.0002	0.0001	128.00	Option 1: VP50 = .0015 VP60 = .0024
Toluene						0.3042	0.2000	0.4512	92.1300	0.0003	0.0243	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.0038	0.0025	0.0025	143.6360	0.9955	0.6274	231.09	
Xylene (-m)						0.0824	0.0513	0.1286	106.1700	0.0008	0.0176	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T-115 - Vertical Fixed Roof Tank
Gallup, NM

Annual Emission Calcaulations

Standing Losses (lb):	77.1199
Vapor Space Volume (cu ft):	14,396.4138
Vapor Density (lb/cu ft):	0.0002
Vapor Space Expansion Factor:	0.0948
Vented Vapor Saturation Factor:	0.9943
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	14,396.4138
Tank Diameter (ft):	33.5000
Vapor Space Outage (ft):	16.3333
Tank Shell Height (ft):	32.0000
Average Liquid Height (ft):	16.0000
Roof Outage (ft):	0.3333
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.3333
Roof Height (ft):	1.0000
Roof Slope (ft/ft):	0.0600
Shell Radius (ft):	16.7500
Vapor Density	
Vapor Density (lb/cu ft):	0.0002
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0066
Daily Avg. Liquid Surface Temp. (deg. R):	517.0582
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	510.5100
Tank Paint Solar Absorptance (Shell):	0.5400
Tank Paint Solar Absorptance (Roof):	0.5400
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0948
Daily Vapor Temperature Range (deg. R):	51.5419
Daily Vapor Pressure Range (psia):	0.0054
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0066
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0037
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0091
Daily Avg. Liquid Surface Temp. (deg R):	517.0582
Daily Min. Liquid Surface Temp. (deg R):	504.1727
Daily Max. Liquid Surface Temp. (deg R):	529.9436
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9943
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0066
Vapor Space Outage (ft):	16.3333
Working Losses (lb):	238.1571
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0066
Annual Net Throughput (gal/yr.):	31,700,000.0000
Annual Turnovers:	150.9524
Turnover Factor:	0.3654
Maximum Liquid Volume (gal):	210,000.0000
Maximum Liquid Height (ft):	32.0000
Tank Diameter (ft):	33.5000
Working Loss Product Factor:	1.0000
Total Losses (lb):	315.2770

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-115 - Vertical Fixed Roof Tank
Gallup, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate - Ciniza	238.16	77.12	315.28
2,2,4-Trimethylpentane	77.07	24.96	102.02
Toluene	5.79	1.87	7.66
Xylene (-m)	4.18	1.35	5.54
1,2,4-Trimethylbenzene	1.05	0.34	1.39
Ethylbenzene	0.63	0.20	0.83
Naphthalene	0.03	0.01	0.04
Unidentified Components	149.41	48.38	197.80

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification		
User Identification:	T-116 (2015 application)	
City:	Gallup	
State:	New Mexico	
Company:	Western Refining Southwest, Inc.	
Type of Tank:	Vertical Fixed Roof Tank	
Description:	Ultra low sulfur diesel	
Tank Dimensions		
Shell Height (ft):		32.00
Diameter (ft):		33.50
Liquid Height (ft) :		32.00
Avg. Liquid Height (ft):		20.00
Volume (gallons):		210,000.00
Turnovers:		150.95
Net Throughput(gal/yr):		31,700,000.00
Is Tank Heated (y/n):	Y	
Paint Characteristics		
Shell Color/Shade:	White/White	
Shell Condition	Good	
Roof Color/Shade:	White/White	
Roof Condition:	Good	
Roof Characteristics		
Type:	Cone	
Height (ft)		1.00
Slope (ft/ft) (Cone Roof)		0.06
Breather Vent Settings		
Vacuum Settings (psig):		0.00
Pressure Settings (psig)		0.00

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-116 (2015 application) - Vertical Fixed Roof Tank
Gallup, New Mexico

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Diesel #2 - Ciniza	All	100.00	100.00	100.00	48.62	0.0220	0.0220	0.0220	130.0000			217.00	
1,2,4-Trimethylbenzene						0.0878	0.0878	0.0878	120.1900	0.0039	0.0260	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane						1.7084	1.7084	1.7084	114.2300	0.0001	0.0130	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Cyclohexane						3.2637	3.2637	3.2637	84.1600	0.0004	0.0991	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.3862	0.3862	0.3862	106.1700	0.0002	0.0059	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Isopropyl benzene						0.1998	0.1998	0.1998	120.2000	0.0001	0.0015	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Naphthalene						0.0110	0.0110	0.0110	128.0000	0.0018	0.0015	128.00	
Toluene						1.0303	1.0303	1.0303	92.1300	0.0006	0.0469	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.0149	0.0148	0.0149	147.6704	0.9908	0.7543	218.86	
Xylene (-m)						0.3259	0.3259	0.3259	106.1700	0.0021	0.0519	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T-116 (2015 application) - Vertical Fixed Roof Tank
Gallup, New Mexico

Annual Emission Calcaulations	
Standing Losses (lb):	0.0000

Vapor Space Volume (cu ft):	10,870.7614
Vapor Density (lb/cu ft):	0.0005
Vapor Space Expansion Factor:	0.0000
Vented Vapor Saturation Factor:	0.9858
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	10,870.7614
Tank Diameter (ft):	33.5000
Vapor Space Outage (ft):	12.3333
Tank Shell Height (ft):	32.0000
Average Liquid Height (ft):	20.0000
Roof Outage (ft):	0.3333
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.3333
Roof Height (ft):	1.0000
Roof Slope (ft/ft):	0.0600
Shell Radius (ft):	16.7500
Vapor Density	
Vapor Density (lb/cu ft):	0.0005
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0220
Daily Avg. Liquid Surface Temp. (deg. R):	559.6700
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	508.2900
Tank Paint Solar Absorptance (Shell):	0.1700
Tank Paint Solar Absorptance (Roof):	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0000
Daily Vapor Temperature Range (deg. R):	0.0000
Daily Vapor Pressure Range (psia):	0.0000
Breather Vent Press. Setting Range(psia):	0.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0220
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0220
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0220
Daily Avg. Liquid Surface Temp. (deg R):	559.6700
Daily Min. Liquid Surface Temp. (deg R):	559.6700
Daily Max. Liquid Surface Temp. (deg R):	559.6700
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9858
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0220
Vapor Space Outage (ft):	12.3333
Working Losses (lb):	788.7698
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0220
Annual Net Throughput (gal/yr.):	31,700,000.0000
Annual Turnovers:	150.9524
Turnover Factor:	0.3654
Maximum Liquid Volume (gal):	210,000.0000
Maximum Liquid Height (ft):	32.0000
Tank Diameter (ft):	33.5000
Working Loss Product Factor:	1.0000
Total Losses (lb):	788.7698

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-116 (2015 application) - Vertical Fixed Roof Tank
Gallup, New Mexico

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Diesel #2 - Ciniza	788.77	0.00	788.77
Cyclohexane	78.13	0.00	78.13
2,2,4-Trimethylpentane	10.22	0.00	10.22
Toluene	36.99	0.00	36.99
Ethylbenzene	4.62	0.00	4.62
Xylene (-m)	40.96	0.00	40.96
Isopropyl benzene	1.20	0.00	1.20
1,2,4-Trimethylbenzene	20.50	0.00	20.50
Naphthalene	1.18	0.00	1.18

Unidentified Components	594.96	0.00	594.96

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification	
User Identification:	T-225
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Vertical Fixed Roof Tank
Description:	Distillate
Tank Dimensions	
Shell Height (ft):	40.00
Diameter (ft):	67.00
Liquid Height (ft) :	40.00
Avg. Liquid Height (ft):	30.00
Volume (gallons):	1,050,000.00
Turnovers:	42.86
Net Throughput(gal/yr):	45,000,000.00
Is Tank Heated (y/n):	N
Paint Characteristics	
Shell Color/Shade:	Gray/Light
Shell Condition	Good
Roof Color/Shade:	Gray/Light
Roof Condition:	Good
Roof Characteristics	
Type:	Cone
Height (ft)	2.00
Slope (ft/ft) (Cone Roof)	0.06
Breather Vent Settings	
Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-225 - Vertical Fixed Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Distillate - Ciniza	All	57.39	44.50	70.27	50.84	0.0066	0.0037	0.0091	130.0000			230.00	Option 1: VP50 = .0045 VP60 = .0074
1,2,4-Trimethylbenzene						0.0184	0.0107	0.0305	120.1900	0.0009	0.0044	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane						0.5522	0.3747	0.7954	114.2300	0.0022	0.3236	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Ethylbenzene						0.0990	0.0620	0.1539	106.1700	0.0001	0.0026	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Naphthalene						0.0022	0.0012	0.0037	128.0000	0.0002	0.0001	128.00	Option 1: VP50 = .0015 VP60 = .0024
Toluene						0.3042	0.2000	0.4512	92.1300	0.0003	0.0243	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.0038	0.0025	0.0025	143.6360	0.9955	0.6274	231.09	
Xylene (-m)						0.0824	0.0513	0.1286	106.1700	0.0008	0.0176	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T-225 - Vertical Fixed Roof Tank
Gallup, NM

Annual Emission Calcaulations

Standing Losses (lb):	201.8566
Vapor Space Volume (cu ft):	37,606.9584
Vapor Density (lb/cu ft):	0.0002
Vapor Space Expansion Factor:	0.0948
Vented Vapor Saturation Factor:	0.9963
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	37,606.9584
Tank Diameter (ft):	67.0000
Vapor Space Outage (ft):	10.6667
Tank Shell Height (ft):	40.0000
Average Liquid Height (ft):	30.0000
Roof Outage (ft):	0.6667
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.6667
Roof Height (ft):	2.0000
Roof Slope (ft/ft):	0.0600
Shell Radius (ft):	33.5000
Vapor Density	
Vapor Density (lb/cu ft):	0.0002
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0066
Daily Avg. Liquid Surface Temp. (deg. R):	517.0582
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	510.5100
Tank Paint Solar Absorptance (Shell):	0.5400
Tank Paint Solar Absorptance (Roof):	0.5400
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0948
Daily Vapor Temperature Range (deg. R):	51.5419
Daily Vapor Pressure Range (psia):	0.0054
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0066
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0037
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0091
Daily Avg. Liquid Surface Temp. (deg R):	517.0582
Daily Min. Liquid Surface Temp. (deg R):	504.1727
Daily Max. Liquid Surface Temp. (deg R):	529.9436
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9963
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0066
Vapor Space Outage (ft):	10.6667
Working Losses (lb):	801.8526
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0066
Annual Net Throughput (gal/yr.):	45,000,000.0000
Annual Turnovers:	42.8571
Turnover Factor:	0.8667
Maximum Liquid Volume (gal):	1,050,000.0000
Maximum Liquid Height (ft):	40.0000
Tank Diameter (ft):	67.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	1,003.7091

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-225 - Vertical Fixed Roof Tank
Gallup, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate - Ciniza	801.85	201.86	1,003.71
2,2,4-Trimethylpentane	259.48	65.32	324.80
Toluene	19.49	4.91	24.40
Xylene (-m)	14.08	3.54	17.62
1,2,4-Trimethylbenzene	3.53	0.89	4.42
Ethylbenzene	2.12	0.53	2.65
Naphthalene	0.09	0.02	0.12
Unidentified Components	503.07	126.64	629.71

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification		
User Identification:	T-226	
City:	Gallup	
State:	NM	
Company:	Western Refining Southwest, Inc.	
Type of Tank:	Vertical Fixed Roof Tank	
Description:	Kerosene	
Tank Dimensions		
Shell Height (ft):		40.00
Diameter (ft):		67.00
Liquid Height (ft) :		40.00
Avg. Liquid Height (ft):		30.00
Volume (gallons):		1,050,000.00
Turnovers:		3.52
Net Throughput(gal/yr):		3,700,000.00
Is Tank Heated (y/n):	N	
Paint Characteristics		
Shell Color/Shade:	Gray/Light	
Shell Condition	Good	
Roof Color/Shade:	Gray/Light	
Roof Condition:	Good	
Roof Characteristics		
Type:	Cone	
Height (ft)		2.00
Slope (ft/ft) (Cone Roof)		0.06
Breather Vent Settings		
Vacuum Settings (psig):		-0.03
Pressure Settings (psig)		0.03

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-226 - Vertical Fixed Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Kerosene - Ciniza	All	57.39	44.50	70.27	50.84	0.0078	0.0050	0.0111	130.0000			175.00	Option 1: VP50 = .006 VP60 = .0085
1,2,4-Trimethylbenzene						0.0184	0.0107	0.0305	120.1900	0.0087	0.0274	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane						0.5522	0.3747	0.7954	114.2300	0.0009	0.0853	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Cyclohexane						1.1282	0.7837	1.5897	84.1600	0.0002	0.0387	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0990	0.0620	0.1539	106.1700	0.0004	0.0068	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.7870	1.2595	2.4843	86.1700	0.0001	0.0307	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopropyl benzene						0.0463	0.0279	0.0744	120.2000	0.0003	0.0024	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Naphthalene						0.0022	0.0012	0.0037	128.0000	0.0064	0.0024	128.00	Option 1: VP50 = .0015 VP60 = .0024
Phenol						0.0065	0.0045	0.0101	94.0000	0.0077	0.0086	94.00	Option 1: VP50 = .005 VP60 = .007
Toluene						0.3042	0.2000	0.4512	92.1300	0.0006	0.0313	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.0051	0.0035	0.0036	147.2603	0.9703	0.7043	178.22	
Xylene (-m)						0.0824	0.0513	0.1286	106.1700	0.0044	0.0622	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T-226 - Vertical Fixed Roof Tank
Gallup, NM

Annual Emission Calcaulations	
Standing Losses (lb):	238.4741
Vapor Space Volume (cu ft):	37,606.9584
Vapor Density (lb/cu ft):	0.0002
Vapor Space Expansion Factor:	0.0949
Vented Vapor Saturation Factor:	0.9956
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	37,606.9584
Tank Diameter (ft):	67.0000
Vapor Space Outage (ft):	10.6667
Tank Shell Height (ft):	40.0000
Average Liquid Height (ft):	30.0000
Roof Outage (ft):	0.6667
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.6667
Roof Height (ft):	2.0000
Roof Slope (ft/ft):	0.0597
Shell Radius (ft):	33.5000
Vapor Density	
Vapor Density (lb/cu ft):	0.0002
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0078
Daily Avg. Liquid Surface Temp. (deg. R):	517.0582
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	510.5100
Tank Paint Solar Absorptance (Shell):	0.5400
Tank Paint Solar Absorptance (Roof):	0.5400
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0949
Daily Vapor Temperature Range (deg. R):	51.5419
Daily Vapor Pressure Range (psia):	0.0062
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0078
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0050
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0111
Daily Avg. Liquid Surface Temp. (deg R):	517.0582
Daily Min. Liquid Surface Temp. (deg R):	504.1727
Daily Max. Liquid Surface Temp. (deg R):	529.9436
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9956
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0078
Vapor Space Outage (ft):	10.6667
Working Losses (lb):	89.8673
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0078
Annual Net Throughput (gal/yr.):	3,700,000.0000
Annual Turnovers:	3.5238
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	1,050,000.0000
Maximum Liquid Height (ft):	40.0000
Tank Diameter (ft):	67.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	328.3414

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-226 - Vertical Fixed Roof Tank
Gallup, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Kerosene - Ciniza	89.87	238.47	328.34
Hexane (-n)	2.75	7.31	10.07
Cyclohexane	3.48	9.23	12.71
2,2,4-Trimethylpentane	7.66	20.33	28.00
Toluene	2.81	7.47	10.28
Ethylbenzene	0.61	1.62	2.23
Xylene (-m)	5.59	14.83	20.42
Isopropyl benzene	0.21	0.57	0.78
1,2,4-Trimethylbenzene	2.47	6.55	9.01
Naphthalene	0.21	0.57	0.78
Phenol	0.77	2.04	2.81
Unidentified Components	63.29	167.96	231.25

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T-227
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Vertical Fixed Roof Tank
Description:	Kerosene

Tank Dimensions

Shell Height (ft):	32.00
Diameter (ft):	33.50
Liquid Height (ft) :	32.00
Avg. Liquid Height (ft):	20.00
Volume (gallons):	210,000.00
Turnovers:	83.81
Net Throughput(gal/yr):	17,600,000.00
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Light
Shell Condition	Good
Roof Color/Shade:	Gray/Light
Roof Condition:	Good

Roof Characteristics

Type:	Cone
Height (ft)	1.00
Slope (ft/ft) (Cone Roof)	0.06

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-227 - Vertical Fixed Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Kerosene - Ciniza	All	57.39	44.50	70.27	50.84	0.0078	0.0050	0.0111	130.0000			175.00	Option 1: VP50 = .006 VP60 = .0085
1,2,4-Trimethylbenzene						0.0184	0.0107	0.0305	120.1900	0.0087	0.0274	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane						0.5522	0.3747	0.7954	114.2300	0.0009	0.0853	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Cyclohexane						1.1282	0.7837	1.5897	84.1600	0.0002	0.0387	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0990	0.0620	0.1539	106.1700	0.0004	0.0068	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.7870	1.2595	2.4843	86.1700	0.0001	0.0307	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopropyl benzene						0.0463	0.0279	0.0744	120.2000	0.0003	0.0024	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Naphthalene						0.0022	0.0012	0.0037	128.0000	0.0064	0.0024	128.00	Option 1: VP50 = .0015 VP60 = .0024
Phenol						0.0065	0.0045	0.0101	94.0000	0.0077	0.0086	94.00	Option 1: VP50 = .005 VP60 = .007
Toluene						0.3042	0.2000	0.4512	92.1300	0.0006	0.0313	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.0051	0.0035	0.0036	147.2603	0.9703	0.7043	178.22	
Xylene (-m)						0.0824	0.0513	0.1286	106.1700	0.0044	0.0622	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T-227 - Vertical Fixed Roof Tank
Gallup, NM

Annual Emission Calcaulations

Standing Losses (lb):	68.8864
Vapor Space Volume (cu ft):	10,870.7614
Vapor Density (lb/cu ft):	0.0002
Vapor Space Expansion Factor:	0.0949
Vented Vapor Saturation Factor:	0.9949
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	10,870.7614
Tank Diameter (ft):	33.5000
Vapor Space Outage (ft):	12.3333
Tank Shell Height (ft):	32.0000
Average Liquid Height (ft):	20.0000
Roof Outage (ft):	0.3333
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.3333
Roof Height (ft):	1.0000
Roof Slope (ft/ft):	0.0600
Shell Radius (ft):	16.7500
Vapor Density	
Vapor Density (lb/cu ft):	0.0002
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0078
Daily Avg. Liquid Surface Temp. (deg. R):	517.0582
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	510.5100
Tank Paint Solar Absorptance (Shell):	0.5400
Tank Paint Solar Absorptance (Roof):	0.5400
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0949
Daily Vapor Temperature Range (deg. R):	51.5419
Daily Vapor Pressure Range (psia):	0.0062
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0078
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0050
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0111
Daily Avg. Liquid Surface Temp. (deg R):	517.0582
Daily Min. Liquid Surface Temp. (deg R):	504.1727
Daily Max. Liquid Surface Temp. (deg R):	529.9436
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9949
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0078
Vapor Space Outage (ft):	12.3333
Working Losses (lb):	224.2634
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0078
Annual Net Throughput (gal/yr.):	17,600,000.0000
Annual Turnovers:	83.8095
Turnover Factor:	0.5246
Maximum Liquid Volume (gal):	210,000.0000
Maximum Liquid Height (ft):	32.0000
Tank Diameter (ft):	33.5000
Working Loss Product Factor:	1.0000
Total Losses (lb):	293.1498

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-227 - Vertical Fixed Roof Tank
Gallup, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Kerosene - Ciniza	224.26	68.89	293.15
Hexane (-n)	6.87	2.11	8.99
Cyclohexane	8.68	2.67	11.35
2,2,4-Trimethylpentane	19.12	5.87	24.99
Toluene	7.02	2.16	9.18
Ethylbenzene	1.52	0.47	1.99
Xylene (-m)	13.95	4.28	18.23
Isopropyl benzene	0.53	0.16	0.70
1,2,4-Trimethylbenzene	6.16	1.89	8.05
Naphthalene	0.53	0.16	0.70
Phenol	1.92	0.59	2.51
Unidentified Components	157.95	48.52	206.47

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T-228
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Vertical Fixed Roof Tank
Description:	Kerosene

Tank Dimensions

Shell Height (ft):	32.00
Diameter (ft):	33.50
Liquid Height (ft) :	32.00
Avg. Liquid Height (ft):	20.00
Volume (gallons):	210,000.00
Turnovers:	83.81
Net Throughput(gal/yr):	17,600,000.00
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Light
Shell Condition	Good
Roof Color/Shade:	Gray/Light
Roof Condition:	Good

Roof Characteristics

Type:	Cone
Height (ft)	1.00
Slope (ft/ft) (Cone Roof)	0.06

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-228 - Vertical Fixed Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Kerosene - Ciniza	All	57.39	44.50	70.27	50.84	0.0078	0.0050	0.0111	130.0000			175.00	Option 1: VP50 = .006 VP60 = .0085
1,2,4-Trimethylbenzene						0.0184	0.0107	0.0305	120.1900	0.0087	0.0274	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane						0.5522	0.3747	0.7954	114.2300	0.0009	0.0853	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Cyclohexane						1.1282	0.7837	1.5897	84.1600	0.0002	0.0387	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0990	0.0620	0.1539	106.1700	0.0004	0.0068	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.7870	1.2595	2.4843	86.1700	0.0001	0.0307	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopropyl benzene						0.0463	0.0279	0.0744	120.2000	0.0003	0.0024	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Naphthalene						0.0022	0.0012	0.0037	128.0000	0.0064	0.0024	128.00	Option 1: VP50 = .0015 VP60 = .0024
Phenol						0.0065	0.0045	0.0101	94.0000	0.0077	0.0086	94.00	Option 1: VP50 = .005 VP60 = .007
Toluene						0.3042	0.2000	0.4512	92.1300	0.0006	0.0313	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.0051	0.0035	0.0036	147.2603	0.9703	0.7043	178.22	
Xylene (-m)						0.0824	0.0513	0.1286	106.1700	0.0044	0.0622	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T-228 - Vertical Fixed Roof Tank
Gallup, NM

Annual Emission Calcaulations

Standing Losses (lb):	68.8864
Vapor Space Volume (cu ft):	10,870.7614
Vapor Density (lb/cu ft):	0.0002
Vapor Space Expansion Factor:	0.0949
Vented Vapor Saturation Factor:	0.9949
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	10,870.7614
Tank Diameter (ft):	33.5000
Vapor Space Outage (ft):	12.3333
Tank Shell Height (ft):	32.0000
Average Liquid Height (ft):	20.0000
Roof Outage (ft):	0.3333
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.3333
Roof Height (ft):	1.0000
Roof Slope (ft/ft):	0.0600
Shell Radius (ft):	16.7500
Vapor Density	
Vapor Density (lb/cu ft):	0.0002
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0078
Daily Avg. Liquid Surface Temp. (deg. R):	517.0582
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	510.5100
Tank Paint Solar Absorptance (Shell):	0.5400
Tank Paint Solar Absorptance (Roof):	0.5400
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0949
Daily Vapor Temperature Range (deg. R):	51.5419
Daily Vapor Pressure Range (psia):	0.0062
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0078
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0050
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0111
Daily Avg. Liquid Surface Temp. (deg R):	517.0582
Daily Min. Liquid Surface Temp. (deg R):	504.1727
Daily Max. Liquid Surface Temp. (deg R):	529.9436
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9949
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0078
Vapor Space Outage (ft):	12.3333
Working Losses (lb):	224.2634
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0078
Annual Net Throughput (gal/yr.):	17,600,000.0000
Annual Turnovers:	83.8095
Turnover Factor:	0.5246
Maximum Liquid Volume (gal):	210,000.0000
Maximum Liquid Height (ft):	32.0000
Tank Diameter (ft):	33.5000
Working Loss Product Factor:	1.0000
Total Losses (lb):	293.1498

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-228 - Vertical Fixed Roof Tank
Gallup, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Kerosene - Ciniza	224.26	68.89	293.15
Hexane (-n)	6.87	2.11	8.99
Cyclohexane	8.68	2.67	11.35
2,2,4-Trimethylpentane	19.12	5.87	24.99
Toluene	7.02	2.16	9.18
Ethylbenzene	1.52	0.47	1.99
Xylene (-m)	13.95	4.28	18.23
Isopropyl benzene	0.53	0.16	0.70
1,2,4-Trimethylbenzene	6.16	1.89	8.05
Naphthalene	0.53	0.16	0.70
Phenol	1.92	0.59	2.51
Unidentified Components	157.95	48.52	206.47

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T-231
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Vertical Fixed Roof Tank
Description:	Recovered Oil

Tank Dimensions

Shell Height (ft):	32.00
Diameter (ft):	33.50
Liquid Height (ft) :	32.00
Avg. Liquid Height (ft):	20.00
Volume (gallons):	210,000.00
Turnovers:	24.29
Net Throughput(gal/yr):	5,100,000.00
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Light
Shell Condition	Good
Roof Color/Shade:	Gray/Light
Roof Condition:	Good

Roof Characteristics

Type:	Cone
Height (ft)	1.00
Slope (ft/ft) (Cone Roof)	0.06

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-231 - Vertical Fixed Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Recovered Oil - Ciniza	All	57.39	44.50	70.27	50.84	0.7478	0.4901	1.1082	105.0000			184.00	Option 1: VP50 = .6 VP60 = .8
1,2,4-Trimethylbenzene						0.0184	0.0107	0.0305	120.1900	0.0114	0.0005	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane						0.5522	0.3747	0.7954	114.2300	0.0064	0.0083	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
2-Methyl-1-butene						4.2310	3.1959	5.5147	70.1300	0.0016	0.0159	70.13	Option 2: A=6.4863, B=1039.69, C=236.65
Benzene						1.0858	0.7476	1.5425	78.1100	0.0057	0.0145	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.1282	0.7837	1.5897	84.1600	0.0066	0.0174	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0990	0.0620	0.1539	106.1700	0.0051	0.0012	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.7870	1.2595	2.4843	86.1700	0.0100	0.0419	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopentane						9.4523	6.7835	12.6067	72.1500	0.0195	0.4320	72.15	Option 1: VP50 = 7.889 VP60 = 10.005
Isopropyl benzene						0.0463	0.0279	0.0744	120.2000	0.0006	0.0001	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Naphthalene						0.0022	0.0012	0.0037	128.0000	0.0024	0.0000	128.00	Option 1: VP50 = .0015 VP60 = .0024
Pentane (-n)						6.4487	4.7951	8.5487	72.1500	0.0094	0.1421	72.15	Option 3: A=27691, B=7.558
Toluene						0.3042	0.2000	0.4512	92.1300	0.0242	0.0173	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.0146	-0.3290	-0.3290	2,217.9922	0.8695	0.3037	217.45	
Xylene (-m)						0.0824	0.0513	0.1286	106.1700	0.0276	0.0053	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T-231 - Vertical Fixed Roof Tank
Gallup, NM

Annual Emission Calcaulations

Standing Losses (lb):	5,754.1927
Vapor Space Volume (cu ft):	10,870.7614
Vapor Density (lb/cu ft):	0.0142
Vapor Space Expansion Factor:	0.1526
Vented Vapor Saturation Factor:	0.6717
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	10,870.7614
Tank Diameter (ft):	33.5000
Vapor Space Outage (ft):	12.3333
Tank Shell Height (ft):	32.0000
Average Liquid Height (ft):	20.0000
Roof Outage (ft):	0.3333
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.3333
Roof Height (ft):	1.0000
Roof Slope (ft/ft):	0.0600
Shell Radius (ft):	16.7500
Vapor Density	
Vapor Density (lb/cu ft):	0.0142
Vapor Molecular Weight (lb/lb-mole):	105.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.7478
Daily Avg. Liquid Surface Temp. (deg. R):	517.0582
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	510.5100
Tank Paint Solar Absorptance (Shell):	0.5400
Tank Paint Solar Absorptance (Roof):	0.5400
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.1526
Daily Vapor Temperature Range (deg. R):	51.5419
Daily Vapor Pressure Range (psia):	0.6182
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.7478
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.4901
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	1.1082
Daily Avg. Liquid Surface Temp. (deg R):	517.0582
Daily Min. Liquid Surface Temp. (deg R):	504.1727
Daily Max. Liquid Surface Temp. (deg R):	529.9436
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.6717
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.7478
Vapor Space Outage (ft):	12.3333
Working Losses (lb):	7,150.4848
Vapor Molecular Weight (lb/lb-mole):	105.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.7478
Annual Net Throughput (gal/yr.):	5,100,000.0000
Annual Turnovers:	24.2857
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	210,000.0000
Maximum Liquid Height (ft):	32.0000
Tank Diameter (ft):	33.5000
Working Loss Product Factor:	0.7500
Total Losses (lb):	12,904.6776

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-231 - Vertical Fixed Roof Tank
Gallup, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Recovered Oil - Ciniza	7,150.48	5,754.19	12,904.68
Isopentane	3,088.69	2,485.55	5,574.24
2-Methyl-1-butene	113.44	91.29	204.73
Pentane (-n)	1,015.79	817.43	1,833.22
Hexane (-n)	299.45	240.97	540.42
Benzene	103.71	83.46	187.17
Cyclohexane	124.77	100.41	225.18
2,2,4-Trimethylpentane	59.23	47.66	106.89
Toluene	123.36	99.27	222.63
Ethylbenzene	8.46	6.81	15.28
Xylene (-m)	38.11	30.67	68.78
1,2,4-Trimethylbenzene	3.51	2.83	6.34
Naphthalene	0.09	0.07	0.16
Isopropyl benzene	0.47	0.37	0.84
Unidentified Components	2,171.42	1,747.40	3,918.82

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification	
User Identification:	T-232 (IFR)
City:	Gallup
State:	New Mexico
Company:	Western Refining Southwest, Inc.
Type of Tank:	Internal Floating Roof Tank
Description:	Internal Floating Roof Tank
Tank Dimensions	
Diameter (ft):	33.50
Volume (gallons):	210,000.00
Turnovers:	24.29
Self Supp. Roof? (y/n):	N
No. of Columns:	1.00
Eff. Col. Diam. (ft):	1.00
Paint Characteristics	
Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good
Rim-Seal System	
Primary Seal:	Mechanical Shoe
Secondary Seal	Rim-mounted
Deck Characteristics	
Deck Fitting Category:	Detail
Deck Type:	Welded

Deck Fitting/Status	Quantity
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1
Automatic Gauge Float Well/Bolted Cover, Gasketed	1
Roof Leg (3-in. Diameter)/Adjustable, Center Area, Gasketed	11
Sample Pipe or Well (24-in. Diam.)/Slotted Pipe-Sliding Cover, Gask.	1
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Ladder Well (36-in Diam.)/Sliding Cover, Gasketed	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-232 (IFR) - Internal Floating Roof Tank
Gallup, New Mexico

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Gasoline (83 Oct. Base) - Ciniza	All	50.98	42.67	59.29	48.62	4.1571	N/A	N/A	67.0000			93.00	Option 4: RVP=9.8, ASTM Slope=2.5
1,2,4-Trimethylbenzene						0.0141	N/A	N/A	120.1900	0.0250	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Benzene						0.9046	N/A	N/A	78.1100	0.0180	0.0054	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.9439	N/A	N/A	84.1600	0.0024	0.0008	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0787	N/A	N/A	106.1700	0.0140	0.0004	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.5057	N/A	N/A	86.1700	0.0100	0.0050	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isooctane						0.4060	N/A	N/A	114.2200	0.0400	0.0054	114.22	Option 1: VP50 = .387 VP60 = .58
Isopropyl benzene						0.0362	N/A	N/A	120.2000	0.0050	0.0001	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Toluene						0.2478	N/A	N/A	92.1300	0.0700	0.0058	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						5.3363	N/A	N/A	66.5466	0.7456	0.9755	90.63	
Xylene (-m)						0.0654	N/A	N/A	106.1700	0.0700	0.0015	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d

Emissions Report - Detail Format
Detail Calculations (AP-42)

T-232 (IFR) - Internal Floating Roof Tank
Gallup, New Mexico

Annual Emission Calcaulations	
Rim Seal Losses (lb):	153.7526
Seal Factor A (lb-mole/ft-yr):	0.6000
Seal Factor B (lb-mole/ft-yr (mph)^n):	0.4000
Value of Vapor Pressure Function:	0.1142
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	4.1571
Tank Diameter (ft):	33.5000
Vapor Molecular Weight (lb/lb-mole):	67.0000
Product Factor:	1.0000
Withdrawal Losses (lb):	30.6254
Number of Columns:	1.0000
Effective Column Diameter (ft):	1.0000
Annual Net Throughput (gal/yr.):	5,100,000.0000
Shell Clingage Factor (bbl/1000 sqft):	0.0015
Average Organic Liquid Density (lb/gal):	5.8000
Tank Diameter (ft):	33.5000
Deck Fitting Losses (lb):	891.9948
Value of Vapor Pressure Function:	0.1142
Vapor Molecular Weight (lb/lb-mole):	67.0000
Product Factor:	1.0000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	116.6100
Deck Seam Losses (lb):	0.0000
Deck Seam Length (ft):	0.0000
Deck Seam Loss per Unit Length Factor (lb-mole/ft-yr):	0.0000
Deck Seam Length Factor(ft/sqft):	0.0000
Tank Diameter (ft):	33.5000
Vapor Molecular Weight (lb/lb-mole):	67.0000
Product Factor:	1.0000
Total Losses (lb):	1,076.3728

0.54 tpy

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors KFa(lb-mole/yr)	KFb(lb-mole/(yr mph^n))	m	Losses(lb)
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1	1.60	0.00	0.00	12.2390
Automatic Gauge Float Well/Bolted Cover, Gasketed	1	2.80	0.00	0.00	21.4183
Roof Leg (3-in. Diameter)/Adjustable, Center Area, Gasketed	11	0.53	0.11	0.13	44.5959
Sample Pipe or Well (24-in. Diam.)/Slotted Pipe-Sliding Cover, Gask.	1	43.00	0.00	0.00	328.9236
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Gask.	1	0.47	0.02	0.97	3.5952
Ladder Well (36-in Diam.)/Sliding Cover, Gasketed	1	56.00	0.00	0.00	428.3656
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	47.4262
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1	0.71	0.10	1.00	5.4311

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-232 (IFR) - Internal Floating Roof Tank
Gallup, New Mexico

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Benzene	0.84	0.55	4.85	0.00	6.24
Isooctane	0.83	1.23	4.84	0.00	6.90
Toluene	0.89	2.14	5.17	0.00	8.20
Ethylbenzene	0.06	0.43	0.33	0.00	0.81
Xylene (-m)	0.23	2.14	1.36	0.00	3.74
Isopropyl benzene	0.01	0.15	0.05	0.00	0.22
1,2,4-Trimethylbenzene	0.02	0.77	0.11	0.00	0.89
Cyclohexane	0.12	0.07	0.67	0.00	0.86
Unidentified Components	149.98	22.83	870.13	0.00	1,042.95
Gasoline (83 Oct. Base) - Ciniza	153.75	30.63	891.99	0.00	1,076.37
Hexane (-n)	0.77	0.31	4.48	0.00	5.56

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T-235
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Vertical Fixed Roof Tank
Description:	Diesel

Tank Dimensions

Shell Height (ft):	32.00
Diameter (ft):	33.50
Liquid Height (ft) :	32.00
Avg. Liquid Height (ft):	20.00
Volume (gallons):	210,000.00
Turnovers:	24.29
Net Throughput(gal/yr):	5,100,000.00
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Roof Characteristics

Type:	Cone
Height (ft)	1.00
Slope (ft/ft) (Cone Roof)	0.06

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-235 - Vertical Fixed Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Diesel #2 - Ciniza	All	50.98	42.67	59.29	48.62	0.0048	0.0035	0.0072	130.0000			217.00	Option 1: VP50 = .0045 VP60 = .0074
1,2,4-Trimethylbenzene						0.0141	0.0099	0.0199	120.1900	0.0039	0.0192	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane						0.4568	0.3539	0.5837	114.2300	0.0001	0.0159	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Cyclohexane						0.9439	0.7428	1.1885	84.1600	0.0004	0.1317	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0787	0.0578	0.1059	106.1700	0.0002	0.0055	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Isopropyl benzene						0.0362	0.0259	0.0498	120.2000	0.0001	0.0013	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Naphthalene						0.0016	0.0011	0.0023	128.0000	0.0018	0.0010	128.00	Option 1: VP50 = .0015 VP60 = .0024
Toluene						0.2478	0.1881	0.3230	92.1300	0.0006	0.0519	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.0030	0.0025	0.0025	152.9611	0.9908	0.7256	218.86	
Xylene (-m)						0.0654	0.0479	0.0882	106.1700	0.0021	0.0479	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T-235 - Vertical Fixed Roof Tank
Gallup, NM

Annual Emission Calcaulations

Standing Losses (lb):	26.9960
Vapor Space Volume (cu ft):	10,870.7614
Vapor Density (lb/cu ft):	0.0001
Vapor Space Expansion Factor:	0.0601
Vented Vapor Saturation Factor:	0.9969
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	10,870.7614
Tank Diameter (ft):	33.5000
Vapor Space Outage (ft):	12.3333
Tank Shell Height (ft):	32.0000
Average Liquid Height (ft):	20.0000
Roof Outage (ft):	0.3333
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.3333
Roof Height (ft):	1.0000
Roof Slope (ft/ft):	0.0600
Shell Radius (ft):	16.7500
Vapor Density	
Vapor Density (lb/cu ft):	0.0001
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0048
Daily Avg. Liquid Surface Temp. (deg. R):	510.6529
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	508.2900
Tank Paint Solar Absorptance (Shell):	0.1700
Tank Paint Solar Absorptance (Roof):	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0601
Daily Vapor Temperature Range (deg. R):	33.2462
Daily Vapor Pressure Range (psia):	0.0037
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0048
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0035
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0072
Daily Avg. Liquid Surface Temp. (deg R):	510.6529
Daily Min. Liquid Surface Temp. (deg R):	502.3414
Daily Max. Liquid Surface Temp. (deg R):	518.9645
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9969
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0048
Vapor Space Outage (ft):	12.3333
Working Losses (lb):	75.5355
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0048
Annual Net Throughput (gal/yr.):	5,100,000.0000
Annual Turnovers:	24.2857
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	210,000.0000
Maximum Liquid Height (ft):	32.0000
Tank Diameter (ft):	33.5000
Working Loss Product Factor:	1.0000
Total Losses (lb):	102.5314

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-235 - Vertical Fixed Roof Tank
Gallup, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Diesel #2 - Ciniza	75.54	27.00	102.53
Cyclohexane	9.95	3.56	13.50
2,2,4-Trimethylpentane	1.20	0.43	1.63
Toluene	3.92	1.40	5.32
Ethylbenzene	0.41	0.15	0.56
Xylene (-m)	3.62	1.29	4.91
Isopropyl benzene	0.10	0.03	0.13
1,2,4-Trimethylbenzene	1.45	0.52	1.97
Naphthalene	0.08	0.03	0.10
Unidentified Components	54.81	19.59	74.40

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T-337
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Internal Floating Roof Tank
Description:	Naphtha

Tank Dimensions

Diameter (ft):	60.00
Volume (gallons):	840,000.00
Turnovers:	3.21
Self Supp. Roof? (y/n):	N
No. of Columns:	1.00
Eff. Col. Diam. (ft):	1.00

Paint Characteristics

Internal Shell Condition:	Light Rust
Shell Color/Shade:	Gray/Light
Shell Condition	Good
Roof Color/Shade:	Gray/Light
Roof Condition:	Good

Rim-Seal System

Primary Seal:	Mechanical Shoe
Secondary Seal	Rim-mounted

Deck Characteristics

Deck Fitting Category:	Detail
Deck Type:	Welded

Deck Fitting/Status	Quantity
Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed	1
Automatic Gauge Float Well/Bolted Cover, Gasketed	1
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Ladder Well (36-in. Diam.)/Sliding Cover, Gasketed	1
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Gasketed	17
Sample Pipe or Well (24-in. Diam.)/Slotted Pipe-Sliding Cover, Gask.	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-337 - Internal Floating Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Naphtha - Ciniza	All	57.39	44.50	70.27	50.84	0.5428	N/A	N/A	75.0000			108.00	Option 4: RVP=1.5, ASTM Slope=1.5
1,2,4-Trimethylbenzene						0.0184	N/A	N/A	120.1900	0.0095	0.0005	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane						0.5522	N/A	N/A	114.2300	0.0004	0.0006	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.0858	N/A	N/A	78.1100	0.0073	0.0210	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexene						1.0209	N/A	N/A	82.1500	0.0320	0.0867	82.15	Option 2: A=6.8861, B=1229.973, C=224.1
Ethylbenzene						0.0990	N/A	N/A	106.1700	0.0083	0.0022	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.7870	N/A	N/A	86.1700	0.0295	0.1398	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopentane						9.4523	N/A	N/A	72.1500	0.0021	0.0527	72.15	Option 1: VP50 = 7.889 VP60 = 10.005
Isopropyl benzene						0.0463	N/A	N/A	120.2000	0.0017	0.0002	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Pentane (-n)						6.4487	N/A	N/A	72.1500	0.0054	0.0924	72.15	Option 3: A=27691, B=7.558
Toluene						0.3042	N/A	N/A	92.1300	0.0443	0.0357	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.4085	N/A	N/A	71.0145	0.8154	0.5586	112.33	
Xylene (-m)						0.0824	N/A	N/A	106.1700	0.0441	0.0096	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T-337 - Internal Floating Roof Tank
Gallup, NM

Annual Emission Calcaulations

Rim Seal Losses (lb):	33.2282
Seal Factor A (lb-mole/ft-yr):	0.6000
Seal Factor B (lb-mole/ft-yr (mph)^n):	0.4000
Value of Vapor Pressure Function:	0.0123
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.5428
Tank Diameter (ft):	60.0000
Vapor Molecular Weight (lb/lb-mole):	75.0000
Product Factor:	1.0000
Withdrawal Losses (lb):	9.7070
Number of Columns:	1.0000
Effective Column Diameter (ft):	1.0000
Annual Net Throughput (gal/yr.):	2,700,000.0000
Shell Clingage Factor (bbl/1000 sqft):	0.0015
Average Organic Liquid Density (lb/gal):	6.3000
Tank Diameter (ft):	60.0000
Deck Fitting Losses (lb):	154.4002
Value of Vapor Pressure Function:	0.0123
Vapor Molecular Weight (lb/lb-mole):	75.0000
Product Factor:	1.0000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	167.2800
Deck Seam Losses (lb):	0.0000
Deck Seam Length (ft):	0.0000
Deck Seam Loss per Unit Length Factor (lb-mole/ft-yr):	0.0000
Deck Seam Length Factor(ft/sqft):	0.0000
Tank Diameter (ft):	60.0000
Vapor Molecular Weight (lb/lb-mole):	75.0000
Product Factor:	1.0000
Total Losses (lb):	197.3354

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors KFa(lb-mole/yr)	KFb(lb-mole/(yr mph^n))	m	Losses(lb)
Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed	1	36.00	5.90	1.20	33.2282
Automatic Gauge Float Well/Bolted Cover, Gasketed	1	2.80	0.00	0.00	2.5844
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Gask.	1	0.47	0.02	0.97	0.4338
Ladder Well (36-in. Diam.)/Sliding Cover, Gasketed	1	56.00	0.00	0.00	51.6883
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Gasketed	17	1.30	0.08	0.65	20.3984
Sample Pipe or Well (24-in. Diam.)/Slotted Pipe-Sliding Cover, Gask.	1	43.00	0.00	0.00	39.6892
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	5.7226
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1	0.71	0.10	1.00	0.6553

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-337 - Internal Floating Roof Tank
Gallup, NM

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Naphtha - Ciniza	33.23	9.71	154.40	0.00	197.34
Isopentane	1.75	0.02	8.13	0.00	9.90
Pentane (-n)	3.07	0.05	14.26	0.00	17.39
Hexane (-n)	4.65	0.29	21.59	0.00	26.53
Benzene	0.70	0.07	3.25	0.00	4.02
Cyclohexene	2.88	0.31	13.38	0.00	16.57
2,2,4-Trimethylpentane	0.02	0.00	0.09	0.00	0.11
Toluene	1.19	0.43	5.52	0.00	7.14
Ethylbenzene	0.07	0.08	0.34	0.00	0.49
Xylene (-m)	0.32	0.43	1.49	0.00	2.24
Isopropyl benzene	0.01	0.02	0.03	0.00	0.06
1,2,4-Trimethylbenzene	0.02	0.09	0.07	0.00	0.18
Unidentified Components	18.56	7.92	86.25	0.00	112.72

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T-338 & T-339 IFR
City:	Gallup
State:	New Mexico
Company:	Western Refining Southwest, Inc.
Type of Tank:	Internal Floating Roof Tank
Description:	T-338 and T-339 as IFR Tanks. Normal service for Naphtha

Tank Dimensions

Diameter (ft):		67.00
Volume (gallons):		1,050,000.00
Turnovers:		87.62
Self Supp. Roof? (y/n):	N	
No. of Columns:		1.00
Eff. Col. Diam. (ft):		1.00

Paint Characteristics

Internal Shell Condition:	Light Rust
Shell Color/Shade:	Gray/Light
Shell Condition	Good
Roof Color/Shade:	Gray/Light
Roof Condition:	Good

Rim-Seal System

Primary Seal:	Mechanical Shoe
Secondary Seal	Rim-mounted

Deck Characteristics

Deck Fitting Category:	Detail
Deck Type:	Welded

Deck Fitting/Status	**Quantity**
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1
Automatic Gauge Float Well/Bolted Cover, Gasketed	1
Column Well (24-in. Diam.)/Built-Up Col.-Sliding Cover, Gask.	1
Ladder Well (36-in Diam.)/Sliding Cover, Gasketed	1
Roof Leg or Hanger Well/Fixed	20
Sample Pipe or Well (24-in. Diam.)/Slotted Pipe-Sliding Cover, Gask.	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-338 & T-339 IFR - Internal Floating Roof Tank
Gallup, New Mexico

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Naphtha - Ciniza	All	57.39	44.50	70.27	50.84	0.5428	N/A	N/A	75.0000			108.00	Option 4: RVP=1.5, ASTM Slope=1.5
1,2,4-Trimethylbenzene						0.0184	N/A	N/A	120.1900	0.0095	0.0005	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane						0.5522	N/A	N/A	114.2300	0.0004	0.0006	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.0858	N/A	N/A	78.1100	0.0073	0.0210	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexene						1.0209	N/A	N/A	82.1500	0.0320	0.0867	82.15	Option 2: A=6.8861, B=1229.973, C=224.1
Ethylbenzene						0.0990	N/A	N/A	106.1700	0.0083	0.0022	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.7870	N/A	N/A	86.1700	0.0295	0.1398	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopentane						9.4523	N/A	N/A	72.1500	0.0021	0.0527	72.15	Option 1: VP50 = 7.889 VP60 = 10.005
Isopropyl benzene						0.0463	N/A	N/A	120.2000	0.0017	0.0002	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Pentane (-n)						6.4487	N/A	N/A	72.1500	0.0054	0.0924	72.15	Option 3: A=27691, B=7.558
Toluene						0.3042	N/A	N/A	92.1300	0.0443	0.0357	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.4085	N/A	N/A	71.0145	0.8154	0.5586	112.33	
Xylene (-m)						0.0824	N/A	N/A	106.1700	0.0441	0.0096	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d

Emissions Report - Detail Format
Detail Calculations (AP-42)

T-338 & T-339 IFR - Internal Floating Roof Tank
Gallup, New Mexico

Annual Emission Calcaulations	
Rim Seal Losses (lb):	37.1048
Seal Factor A (lb-mole/ft-yr):	0.6000
Seal Factor B (lb-mole/ft-yr (mph)^n):	0.4000
Value of Vapor Pressure Function:	0.0123
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.5428
Tank Diameter (ft):	67.0000
Vapor Molecular Weight (lb/lb-mole):	75.0000
Product Factor:	1.0000
Withdrawal Losses (lb):	295.6932
Number of Columns:	1.0000
Effective Column Diameter (ft):	1.0000
Annual Net Throughput (gal/yr.):	92,000,000.0000
Shell Clingage Factor (bbl/1000 sqft):	0.0015
Average Organic Liquid Density (lb/gal):	6.3000
Tank Diameter (ft):	67.0000
Deck Fitting Losses (lb):	131.6205
Value of Vapor Pressure Function:	0.0123
Vapor Molecular Weight (lb/lb-mole):	75.0000
Product Factor:	1.0000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	142.6000
Deck Seam Losses (lb):	0.0000
Deck Seam Length (ft):	0.0000
Deck Seam Loss per Unit Length Factor (lb-mole/ft-yr):	0.0000
Deck Seam Length Factor(ft/sqft):	0.0000
Tank Diameter (ft):	67.0000
Vapor Molecular Weight (lb/lb-mole):	75.0000
Product Factor:	1.0000
Total Losses (lb):	464.4185

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors KFa(lb-mole/yr)	KFb(lb-mole/(yr mph^n))	m	Losses(lb)
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1	1.60	0.00	0.00	1.4768
Automatic Gauge Float Well/Bolted Cover, Gasketed	1	2.80	0.00	0.00	2.5844
Column Well (24-in. Diam.)/Built-Up Col.-Sliding Cover, Gask.	1	33.00	0.00	0.00	30.4592
Ladder Well (36-in Diam.)/Sliding Cover, Gasketed	1	56.00	0.00	0.00	51.6883
Roof Leg or Hanger Well/Fixed	20	0.00	0.00	0.00	0.0000
Sample Pipe or Well (24-in. Diam.)/Slotted Pipe-Sliding Cover, Gask.	1	43.00	0.00	0.00	39.6892
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	5.7226

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-338 & T-339 IFR - Internal Floating Roof Tank
Gallup, New Mexico

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Naphtha - Ciniza	37.10	295.69	131.62	0.00	464.42
Isopentane	1.95	0.62	6.93	0.00	9.51
Pentane (-n)	3.43	1.60	12.16	0.00	17.18
Hexane (-n)	5.19	8.72	18.41	0.00	32.32
Benzene	0.78	2.16	2.77	0.00	5.71
Cyclohexene	3.22	9.46	11.41	0.00	24.08
2,2,4-Trimethylpentane	0.02	0.12	0.08	0.00	0.22
Toluene	1.33	13.10	4.71	0.00	19.13
Ethylbenzene	0.08	2.45	0.29	0.00	2.82
Xylene (-m)	0.36	13.04	1.27	0.00	14.67
Isopropyl benzene	0.01	0.50	0.03	0.00	0.54
1,2,4-Trimethylbenzene	0.02	2.81	0.06	0.00	2.89
Unidentified Components	20.73	241.11	73.52	0.00	335.36

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T-342
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Vertical Fixed Roof Tank
Description:	Ethanol blendstock

Tank Dimensions

Shell Height (ft):	32.00
Diameter (ft):	33.50
Liquid Height (ft) :	32.00
Avg. Liquid Height (ft):	20.00
Volume (gallons):	210,000.00
Turnovers:	3.33
Net Throughput(gal/yr):	700,000.00
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Roof Characteristics

Type:	Cone
Height (ft)	1.00
Slope (ft/ft) (Cone Roof)	0.06

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-342 - Vertical Fixed Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Ethanol Blendstock	All	50.98	42.67	59.29	48.62	0.4791	0.3540	0.6413	46.1000			47.60	Option 2: A=8.321, B=1718.2, C=237.5
1,2,4-Trimethylbenzene						0.0141	0.0099	0.0199	120.1900	0.0007	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
1-Pentene						7.1230	5.8906	8.5527	70.1400	0.0001	0.0015	70.14	Option 2: A=6.8442, B=1044.01, C=233.5
2-Methyl-1-butene						3.6877	3.0668	4.4043	70.1300	0.0001	0.0008	70.13	Option 2: A=6.4863, B=1039.69, C=236.65
2-Pentene						5.1474	4.3404	6.3942	70.1400	0.0002	0.0022	70.14	Option 1: VP50 = 5 VP60 = 6.5
Benzene						0.9046	0.7076	1.1452	78.1100	0.0007	0.0014	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.9439	0.7428	1.1885	84.1600	0.0011	0.0022	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0787	0.0578	0.1059	106.1700	0.0003	0.0001	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.5057	1.1963	1.8786	86.1700	0.0021	0.0068	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopentane						8.0970	6.4152	9.8557	72.1500	0.0063	0.1099	72.15	Option 1: VP50 = 7.889 VP60 = 10.005
Isopropyl benzene						0.0362	0.0259	0.0498	120.2000	0.0001	0.0000	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Pentane (-n)						5.5760	4.5917	6.7293	72.1500	0.0041	0.0493	72.15	Option 3: A=27691, B=7.558
Toluene						0.2478	0.1881	0.3230	92.1300	0.0019	0.0010	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.4309	0.4189	0.4192	42.7577	0.9808	0.8245	47.23	
Xylene (-m)						0.0654	0.0479	0.0882	106.1700	0.0015	0.0002	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T-342 - Vertical Fixed Roof Tank
Gallup, NM

Annual Emission Calcaulations

Standing Losses (lb):	1,048.6546
Vapor Space Volume (cu ft):	10,870.7614
Vapor Density (lb/cu ft):	0.0040
Vapor Space Expansion Factor:	0.0861
Vented Vapor Saturation Factor:	0.7615
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	10,870.7614
Tank Diameter (ft):	33.5000
Vapor Space Outage (ft):	12.3333
Tank Shell Height (ft):	32.0000
Average Liquid Height (ft):	20.0000
Roof Outage (ft):	0.3333
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.3333
Roof Height (ft):	1.0000
Roof Slope (ft/ft):	0.0600
Shell Radius (ft):	16.7500
Vapor Density	
Vapor Density (lb/cu ft):	0.0040
Vapor Molecular Weight (lb/lb-mole):	46.1000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.4791
Daily Avg. Liquid Surface Temp. (deg. R):	510.6529
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	508.2900
Tank Paint Solar Absorptance (Shell):	0.1700
Tank Paint Solar Absorptance (Roof):	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0861
Daily Vapor Temperature Range (deg. R):	33.2462
Daily Vapor Pressure Range (psia):	0.2872
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.4791
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.3540
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.6413
Daily Avg. Liquid Surface Temp. (deg R):	510.6529
Daily Min. Liquid Surface Temp. (deg R):	502.3414
Daily Max. Liquid Surface Temp. (deg R):	518.9645
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.7615
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.4791
Vapor Space Outage (ft):	12.3333
Working Losses (lb):	368.1259
Vapor Molecular Weight (lb/lb-mole):	46.1000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.4791
Annual Net Throughput (gal/yr.):	700,000.0000
Annual Turnovers:	3.3333
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	210,000.0000
Maximum Liquid Height (ft):	32.0000
Tank Diameter (ft):	33.5000
Working Loss Product Factor:	1.0000
Total Losses (lb):	1,416.7805

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-342 - Vertical Fixed Roof Tank
Gallup, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Ethanol Blendstock	368.13	1,048.65	1,416.78
Cyclohexane	0.82	2.35	3.17
Toluene	0.37	1.06	1.44
Ethylbenzene	0.02	0.05	0.07
Xylene (-m)	0.08	0.22	0.30
Isopropyl benzene	0.00	0.01	0.01
1,2,4-Trimethylbenzene	0.01	0.02	0.03
Isopentane	40.47	115.28	155.75
1-Pentene	0.57	1.61	2.17
2-Methyl-1-butene	0.29	0.83	1.13
Pentane (-n)	18.14	51.67	69.80
2-Pentene	0.82	2.33	3.14
Hexane (-n)	2.51	7.15	9.65
Benzene	0.50	1.43	1.93
Unidentified Components	303.53	864.65	1,168.18

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification	
User Identification:	T-343
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Vertical Fixed Roof Tank
Description:	Ethanol Blendstock
Tank Dimensions	
Shell Height (ft):	32.00
Diameter (ft):	33.50
Liquid Height (ft) :	32.00
Avg. Liquid Height (ft):	20.00
Volume (gallons):	210,000.00
Turnovers:	3.33
Net Throughput(gal/yr):	700,000.00
Is Tank Heated (y/n):	N
Paint Characteristics	
Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good
Roof Characteristics	
Type:	Cone
Height (ft)	1.00
Slope (ft/ft) (Cone Roof)	0.06
Breather Vent Settings	
Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-343 - Vertical Fixed Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Ethanol Blendstock	All	50.98	42.67	59.29	48.62	0.4791	0.3540	0.6413	46.1000			47.60	Option 2: A=8.321, B=1718.2, C=237.5
1,2,4-Trimethylbenzene						0.0141	0.0099	0.0199	120.1900	0.0007	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
1-Pentene						7.1230	5.8906	8.5527	70.1400	0.0001	0.0015	70.14	Option 2: A=6.8442, B=1044.01, C=233.5
2-Methyl-1-butene						3.6877	3.0668	4.4043	70.1300	0.0001	0.0008	70.13	Option 2: A=6.4863, B=1039.69, C=236.65
2-Pentene						5.1474	4.3404	6.3942	70.1400	0.0002	0.0022	70.14	Option 1: VP50 = 5 VP60 = 6.5
Benzene						0.9046	0.7076	1.1452	78.1100	0.0007	0.0014	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.9439	0.7428	1.1885	84.1600	0.0011	0.0022	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0787	0.0578	0.1059	106.1700	0.0003	0.0001	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.5057	1.1963	1.8786	86.1700	0.0021	0.0068	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopentane						8.0970	6.4152	9.8557	72.1500	0.0063	0.1099	72.15	Option 1: VP50 = 7.889 VP60 = 10.005
Isopropyl benzene						0.0362	0.0259	0.0498	120.2000	0.0001	0.0000	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Pentane (-n)						5.5760	4.5917	6.7293	72.1500	0.0041	0.0493	72.15	Option 3: A=27691, B=7.558
Toluene						0.2478	0.1881	0.3230	92.1300	0.0019	0.0010	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.4309	0.4189	0.4192	42.7577	0.9808	0.8245	47.23	
Xylene (-m)						0.0654	0.0479	0.0882	106.1700	0.0015	0.0002	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T-343 - Vertical Fixed Roof Tank
Gallup, NM

Annual Emission Calcaulations

Standing Losses (lb):	1,048.6546
Vapor Space Volume (cu ft):	10,870.7614
Vapor Density (lb/cu ft):	0.0040
Vapor Space Expansion Factor:	0.0861
Vented Vapor Saturation Factor:	0.7615
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	10,870.7614
Tank Diameter (ft):	33.5000
Vapor Space Outage (ft):	12.3333
Tank Shell Height (ft):	32.0000
Average Liquid Height (ft):	20.0000
Roof Outage (ft):	0.3333
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.3333
Roof Height (ft):	1.0000
Roof Slope (ft/ft):	0.0600
Shell Radius (ft):	16.7500
Vapor Density	
Vapor Density (lb/cu ft):	0.0040
Vapor Molecular Weight (lb/lb-mole):	46.1000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.4791
Daily Avg. Liquid Surface Temp. (deg. R):	510.6529
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	508.2900
Tank Paint Solar Absorptance (Shell):	0.1700
Tank Paint Solar Absorptance (Roof):	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0861
Daily Vapor Temperature Range (deg. R):	33.2462
Daily Vapor Pressure Range (psia):	0.2872
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.4791
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.3540
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.6413
Daily Avg. Liquid Surface Temp. (deg R):	510.6529
Daily Min. Liquid Surface Temp. (deg R):	502.3414
Daily Max. Liquid Surface Temp. (deg R):	518.9645
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.7615
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.4791
Vapor Space Outage (ft):	12.3333
Working Losses (lb):	368.1259
Vapor Molecular Weight (lb/lb-mole):	46.1000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.4791
Annual Net Throughput (gal/yr.):	700,000.0000
Annual Turnovers:	3.3333
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	210,000.0000
Maximum Liquid Height (ft):	32.0000
Tank Diameter (ft):	33.5000
Working Loss Product Factor:	1.0000
Total Losses (lb):	1,416.7805

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-343 - Vertical Fixed Roof Tank
Gallup, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Ethanol Blendstock	368.13	1,048.65	1,416.78
Cyclohexane	0.82	2.35	3.17
Toluene	0.37	1.06	1.44
Ethylbenzene	0.02	0.05	0.07
Xylene (-m)	0.08	0.22	0.30
Isopropyl benzene	0.00	0.01	0.01
1,2,4-Trimethylbenzene	0.01	0.02	0.03
Isopentane	40.47	115.28	155.75
1-Pentene	0.57	1.61	2.17
2-Methyl-1-butene	0.29	0.83	1.13
Pentane (-n)	18.14	51.67	69.80
2-Pentene	0.82	2.33	3.14
Hexane (-n)	2.51	7.15	9.65
Benzene	0.50	1.43	1.93
Unidentified Components	303.53	864.65	1,168.18

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T-344
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Internal Floating Roof Tank
Description:	Reformate

Tank Dimensions

Diameter (ft):		60.00
Volume (gallons):		882,000.00
Turnovers:		100.91
Self Supp. Roof? (y/n):	N	
No. of Columns:		1.00
Eff. Col. Diam. (ft):		1.00

Paint Characteristics

Internal Shell Condition:	Light Rust
Shell Color/Shade:	Gray/Light
Shell Condition	Good
Roof Color/Shade:	Gray/Light
Roof Condition:	Good

Rim-Seal System

Primary Seal:	Mechanical Shoe
Secondary Seal	Rim-mounted

Deck Characteristics

Deck Fitting Category:	Detail
Deck Type:	Welded

Deck Fitting/Status	**Quantity**
Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed	1
Automatic Gauge Float Well/Bolted Cover, Gasketed	1
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Ladder Well (36-in. Diam.)/Sliding Cover, Gasketed	1
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Gasketed	17
Sample Pipe or Well (24-in. Diam.)/Slotted Pipe-Sliding Cover, Gask.	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-344 - Internal Floating Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Reformate - Ciniza	All	57.39	44.50	70.27	50.84	1.6309	N/A	N/A	75.0000			99.00	Option 4: RVP=3.8, ASTM Slope=2.5
1,2,4-Trimethylbenzene						0.0184	N/A	N/A	120.1900	0.0391	0.0006	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2-Methyl-1-butene						4.2310	N/A	N/A	70.1300	0.0001	0.0003	70.13	Option 2: A=6.4863, B=1039.69, C=236.65
2-Pentene						6.1082	N/A	N/A	70.1400	0.0002	0.0010	70.14	Option 1: VP50 = 5 VP60 = 6.5
Benzene						1.0858	N/A	N/A	78.1100	0.0467	0.0410	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.1282	N/A	N/A	84.1600	0.0011	0.0010	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0990	N/A	N/A	106.1700	0.0298	0.0024	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.7870	N/A	N/A	86.1700	0.0259	0.0375	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopentane						9.4523	N/A	N/A	72.1500	0.0268	0.2050	72.15	Option 1: VP50 = 7.889 VP60 = 10.005
Isopropyl benzene						0.0463	N/A	N/A	120.2000	0.0020	0.0001	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Naphthalene						0.0022	N/A	N/A	128.0000	0.0044	0.0000	128.00	Option 1: VP50 = .0015 VP60 = .0024
Pentane (-n)						6.4487	N/A	N/A	72.1500	0.0189	0.0986	72.15	Option 3: A=27691, B=7.558
Toluene						0.3042	N/A	N/A	92.1300	0.2082	0.0513	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						2.2556	N/A	N/A	73.8945	0.4315	0.5501	105.81	
Xylene (-m)						0.0824	N/A	N/A	106.1700	0.1653	0.0110	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T-344 - Internal Floating Roof Tank
Gallup, NM

Annual Emission Calcaulations

Rim Seal Losses (lb):	105.1549
Seal Factor A (lb-mole/ft-yr):	0.6000
Seal Factor B (lb-mole/ft-yr (mph)^n):	0.4000
Value of Vapor Pressure Function:	0.0389
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	1.6309
Tank Diameter (ft):	60.0000
Vapor Molecular Weight (lb/lb-mole):	75.0000
Product Factor:	1.0000
Withdrawal Losses (lb):	332.1611
Number of Columns:	1.0000
Effective Column Diameter (ft):	1.0000
Annual Net Throughput (gal/yr.):	89,000,000.0000
Shell Clingage Factor (bbl/1000 sqft):	0.0015
Average Organic Liquid Density (lb/gal):	6.5400
Tank Diameter (ft):	60.0000
Deck Fitting Losses (lb):	488.6197
Value of Vapor Pressure Function:	0.0389
Vapor Molecular Weight (lb/lb-mole):	75.0000
Product Factor:	1.0000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	167.2800
Deck Seam Losses (lb):	0.0000
Deck Seam Length (ft):	0.0000
Deck Seam Loss per Unit Length Factor (lb-mole/ft-yr):	0.0000
Deck Seam Length Factor(ft/sqft):	0.0000
Tank Diameter (ft):	60.0000
Vapor Molecular Weight (lb/lb-mole):	75.0000
Product Factor:	1.0000
Total Losses (lb):	925.9357

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors KFa(lb-mole/yr)	KFb(lb-mole/(yr mph^n))	m	Losses(lb)
Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed	1	36.00	5.90	1.20	105.1549
Automatic Gauge Float Well/Bolted Cover, Gasketed	1	2.80	0.00	0.00	8.1787
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Gask.	1	0.47	0.02	0.97	1.3729
Ladder Well (36-in. Diam.)/Sliding Cover, Gasketed	1	56.00	0.00	0.00	163.5743
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Gasketed	17	1.30	0.08	0.65	64.5534
Sample Pipe or Well (24-in. Diam.)/Slotted Pipe-Sliding Cover, Gask.	1	43.00	0.00	0.00	125.6017
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	18.1100
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1	0.71	0.10	1.00	2.0739

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-344 - Internal Floating Roof Tank
Gallup, NM

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Reformate - Ciniza	105.15	332.16	488.62	0.00	925.94
Isopentane	21.56	8.90	100.18	0.00	130.65
2-Methyl-1-butene	0.04	0.03	0.17	0.00	0.24
Pentane (-n)	10.37	6.28	48.20	0.00	64.85
2-Pentene	0.10	0.07	0.48	0.00	0.65
Hexane (-n)	3.94	8.60	18.30	0.00	30.85
Benzene	4.32	15.51	20.05	0.00	39.88
Cyclohexane	0.11	0.37	0.49	0.00	0.96
Toluene	5.39	69.16	25.05	0.00	99.59
Ethylbenzene	0.25	9.90	1.17	0.00	11.32
Xylene (-m)	1.16	54.91	5.39	0.00	61.45
Isopropyl benzene	0.01	0.66	0.04	0.00	0.71
1,2,4-Trimethylbenzene	0.06	12.99	0.28	0.00	13.33
Naphthalene	0.00	1.46	0.00	0.00	1.47
Unidentified Components	57.85	143.33	268.81	0.00	469.99

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T-345
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Internal Floating Roof Tank
Description:	Reformate

Tank Dimensions

Diameter (ft):	60.00
Volume (gallons):	882,000.00
Turnovers:	3.33
Self Supp. Roof? (y/n):	N
No. of Columns:	1.00
Eff. Col. Diam. (ft):	1.00

Paint Characteristics

Internal Shell Condition:	Light Rust
Shell Color/Shade:	Gray/Light
Shell Condition	Good
Roof Color/Shade:	Gray/Light
Roof Condition:	Good

Rim-Seal System

Primary Seal:	Mechanical Shoe
Secondary Seal	Rim-mounted

Deck Characteristics

Deck Fitting Category:	Detail
Deck Type:	Welded

Deck Fitting/Status	Quantity
Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed	1
Automatic Gauge Float Well/Bolted Cover, Gasketed	1
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Ladder Well (36-in. Diam.)/Sliding Cover, Gasketed	1
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Gasketed	17
Sample Pipe or Well (24-in. Diam.)/Slotted Pipe-Sliding Cover, Gask.	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-345 - Internal Floating Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Reformate - Ciniza	All	57.39	44.50	70.27	50.84	1.6309	N/A	N/A	75.0000			99.00	Option 4: RVP=3.8, ASTM Slope=2.5
1,2,4-Trimethylbenzene						0.0184	N/A	N/A	120.1900	0.0391	0.0006	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2-Methyl-1-butene						4.2310	N/A	N/A	70.1300	0.0001	0.0003	70.13	Option 2: A=6.4863, B=1039.69, C=236.65
2-Pentene						6.1082	N/A	N/A	70.1400	0.0002	0.0010	70.14	Option 1: VP50 = 5 VP60 = 6.5
Benzene						1.0858	N/A	N/A	78.1100	0.0467	0.0410	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.1282	N/A	N/A	84.1600	0.0011	0.0010	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0990	N/A	N/A	106.1700	0.0298	0.0024	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.7870	N/A	N/A	86.1700	0.0259	0.0375	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopentane						9.4523	N/A	N/A	72.1500	0.0268	0.2050	72.15	Option 1: VP50 = 7.889 VP60 = 10.005
Isopropyl benzene						0.0463	N/A	N/A	120.2000	0.0020	0.0001	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Naphthalene						0.0022	N/A	N/A	128.0000	0.0044	0.0000	128.00	Option 1: VP50 = .0015 VP60 = .0024
Pentane (-n)						6.4487	N/A	N/A	72.1500	0.0189	0.0986	72.15	Option 3: A=27691, B=7.558
Toluene						0.3042	N/A	N/A	92.1300	0.2082	0.0513	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						2.2556	N/A	N/A	73.8945	0.4315	0.5501	105.81	
Xylene (-m)						0.0824	N/A	N/A	106.1700	0.1653	0.0110	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T-345 - Internal Floating Roof Tank
Gallup, NM

Annual Emission Calcaulations

Rim Seal Losses (lb):	105.1549
Seal Factor A (lb-mole/ft-yr):	0.6000
Seal Factor B (lb-mole/ft-yr (mph)^n):	0.4000
Value of Vapor Pressure Function:	0.0389
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	1.6309
Tank Diameter (ft):	60.0000
Vapor Molecular Weight (lb/lb-mole):	75.0000
Product Factor:	1.0000
Withdrawal Losses (lb):	10.4500
Number of Columns:	1.0000
Effective Column Diameter (ft):	1.0000
Annual Net Throughput (gal/yr.):	2,800,000.0000
Shell Clingage Factor (bbl/1000 sqft):	0.0015
Average Organic Liquid Density (lb/gal):	6.5400
Tank Diameter (ft):	60.0000
Deck Fitting Losses (lb):	488.6197
Value of Vapor Pressure Function:	0.0389
Vapor Molecular Weight (lb/lb-mole):	75.0000
Product Factor:	1.0000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	167.2800
Deck Seam Losses (lb):	0.0000
Deck Seam Length (ft):	0.0000
Deck Seam Loss per Unit Length Factor (lb-mole/ft-yr):	0.0000
Deck Seam Length Factor(ft/sqft):	0.0000
Tank Diameter (ft):	60.0000
Vapor Molecular Weight (lb/lb-mole):	75.0000
Product Factor:	1.0000
Total Losses (lb):	604.2246

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors KFa(lb-mole/yr)	KFb(lb-mole/(yr mph^n))	m	Losses(lb)
Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed	1	36.00	5.90	1.20	105.1549
Automatic Gauge Float Well/Bolted Cover, Gasketed	1	2.80	0.00	0.00	8.1787
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Gask.	1	0.47	0.02	0.97	1.3729
Ladder Well (36-in. Diam.)/Sliding Cover, Gasketed	1	56.00	0.00	0.00	163.5743
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Gasketed	17	1.30	0.08	0.65	64.5534
Sample Pipe or Well (24-in. Diam.)/Slotted Pipe-Sliding Cover, Gask.	1	43.00	0.00	0.00	125.6017
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	18.1100
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1	0.71	0.10	1.00	2.0739

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-345 - Internal Floating Roof Tank
Gallup, NM

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Reformate - Ciniza	105.15	10.45	488.62	0.00	604.22
Isopentane	21.56	0.28	100.18	0.00	122.03
2-Methyl-1-butene	0.04	0.00	0.17	0.00	0.20
Pentane (-n)	10.37	0.20	48.20	0.00	58.77
2-Pentene	0.10	0.00	0.48	0.00	0.59
Hexane (-n)	3.94	0.27	18.30	0.00	22.51
Benzene	4.32	0.49	20.05	0.00	24.86
Cyclohexane	0.11	0.01	0.49	0.00	0.61
Toluene	5.39	2.18	25.05	0.00	32.61
Ethylbenzene	0.25	0.31	1.17	0.00	1.73
Xylene (-m)	1.16	1.73	5.39	0.00	8.27
Isopropyl benzene	0.01	0.02	0.04	0.00	0.07
1,2,4-Trimethylbenzene	0.06	0.41	0.28	0.00	0.75
Naphthalene	0.00	0.05	0.00	0.00	0.05
Unidentified Components	57.85	4.51	268.81	0.00	331.17

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T-567
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	External Floating Roof Tank
Description:	Low-octane base gasoline

Tank Dimensions

Diameter (ft):	60.00
Volume (gallons):	840,000.00
Turnovers:	50.00

Paint Characteristics

Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition	Good

Roof Characteristics

Type:	Double Deck
Fitting Category	Detail

Tank Construction and Rim-Seal System

Construction:	Welded
Primary Seal:	Liquid-mounted
Secondary Seal	Rim-mounted

Deck Fitting/Status	**Quantity**
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1
Automatic Gauge Float Well/Unbolted Cover, Ungasketed	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Ungask.	1
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Ungask.	1
Roof Drain (3-in. Diameter)/Open	1
Roof Leg (3-in. Diameter)/Adjustable, Double-Deck Roofs	10
Roof Drain (3-in. Diameter)/90% Closed	1

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-567 - External Floating Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Gasoline (83 Oct. Base) - Ciniza	All	50.98	42.67	59.29	48.62	4.1571	N/A	N/A	67.0000			93.00	Option 4: RVP=9.8, ASTM Slope=2.5
1,2,4-Trimethylbenzene						0.0141	N/A	N/A	120.1900	0.0191	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
1-Pentene						7.1230	N/A	N/A	70.1400	0.0019	0.0045	70.14	Option 2: A=6.8442, B=1044.01, C=233.5
2-Methyl-1-butene						3.6877	N/A	N/A	70.1300	0.0042	0.0052	70.13	Option 2: A=6.4863, B=1039.69, C=236.65
2-Pentene						5.1474	N/A	N/A	70.1400	0.0082	0.0141	70.14	Option 1: VP50 = 5 VP60 = 6.5
Benzene						0.9046	N/A	N/A	78.1100	0.0270	0.0082	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.9439	N/A	N/A	84.1600	0.0187	0.0059	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0787	N/A	N/A	106.1700	0.0112	0.0003	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.5057	N/A	N/A	86.1700	0.0504	0.0253	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopentane						8.0970	N/A	N/A	72.1500	0.1119	0.3025	72.15	Option 1: VP50 = 7.889 VP60 = 10.005
Isopropyl benzene						0.0362	N/A	N/A	120.2000	0.0007	0.0000	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Naphthalene						0.0016	N/A	N/A	128.0000	0.0023	0.0000	128.00	Option 1: VP50 = .0015 VP60 = .0024
Pentane (-n)						5.5760	N/A	N/A	72.1500	0.0637	0.1186	72.15	Option 3: A=27691, B=7.558
Phenol						0.0052	N/A	N/A	94.0000	0.0006	0.0000	94.00	Option 1: VP50 = .005 VP60 = .007
Toluene						0.2478	N/A	N/A	92.1300	0.0742	0.0061	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.6956	N/A	N/A	61.9378	0.5386	0.5077	103.01	
Xylene (-m)						0.0654	N/A	N/A	106.1700	0.0674	0.0015	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T-567 - External Floating Roof Tank
Gallup, NM

Annual Emission Calcaulations	
Rim Seal Losses (lb):	715.1114
Seal Factor A (lb-mole/ft-yr):	0.3000
Seal Factor B (lb-mole/ft-yr (mph)^n):	0.6000
Average Wind Speed (mph):	11.8000
Seal-related Wind Speed Exponent:	0.3000
Value of Vapor Pressure Function:	0.1142
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	4.1571
Tank Diameter (ft):	60.0000
Vapor Molecular Weight (lb/lb-mole):	67.0000
Product Factor:	1.0000
Withdrawal Losses (lb):	136.7350
Annual Net Throughput (gal/yr.):	42,000,000.0000
Shell Clingage Factor (bbl/1000 sqft):	0.0015
Average Organic Liquid Density (lb/gal):	5.8000
Tank Diameter (ft):	60.0000
Roof Fitting Losses (lb):	1,003.0357
Value of Vapor Pressure Function:	0.1142
Vapor Molecular Weight (lb/lb-mole):	67.0000
Product Factor:	1.0000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	131.1263
Average Wind Speed (mph):	11.8000
Total Losses (lb):	1,854.8820

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors KFa(lb-mole/yr)	KFb(lb-mole/(yr mph^n))	m	Losses(lb)
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1	1.60	0.00	0.00	12.2390
Automatic Gauge Float Well/Unbolted Cover, Ungasketed	1	14.00	5.40	1.10	528.4951
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	114.2250
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Ungask.	1	0.68	1.80	1.00	118.9326
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Ungask.	1	2.30	0.00	0.00	17.5936
Roof Drain (3-in. Diameter)/Open	1	1.50	0.21	1.70	69.6458
Roof Leg (3-in. Diameter)/Adjustable, Double-Deck Roofs	10	0.82	0.53	0.14	117.2103
Roof Drain (3-in. Diameter)/90% Closed	1	1.80	0.14	1.10	24.6942

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-567 - External Floating Roof Tank
Gallup, NM

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Gasoline (83 Oct. Base) - Ciniza	715.11	136.74	1,003.04	0.00	1,854.88
Isopentane	216.35	15.30	303.45	0.00	535.10
1-Pentene	3.23	0.26	4.53	0.00	8.02
2-Methyl-1-butene	3.70	0.57	5.19	0.00	9.46
Pentane (-n)	84.81	8.71	118.96	0.00	212.48
2-Pentene	10.08	1.12	14.14	0.00	25.34
Hexane (-n)	18.12	6.89	25.42	0.00	50.43
Benzene	5.83	3.69	8.18	0.00	17.70
Cyclohexane	4.21	2.56	5.91	0.00	12.68
Toluene	4.39	10.15	6.16	0.00	20.69
Ethylbenzene	0.21	1.53	0.30	0.00	2.04
Xylene (-m)	1.05	9.22	1.48	0.00	11.74
Isopropyl benzene	0.01	0.10	0.01	0.00	0.11
1,2,4-Trimethylbenzene	0.06	2.61	0.09	0.00	2.77
Naphthalene	0.00	0.31	0.00	0.00	0.32
Phenol	0.00	0.08	0.00	0.00	0.08
Unidentified Components	363.05	73.64	509.23	0.00	945.92

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification		
User Identification:	Not VOC - T-568	
City:	Gallup	
State:	NM	
Company:	Giant Refining Company	
Type of Tank:	Vertical Fixed Roof Tank	
Description:	Ammonium Thiosulfate	
Tank Dimensions		
Shell Height (ft):		24.00
Diameter (ft):		25.00
Liquid Height (ft) :		24.00
Avg. Liquid Height (ft):		12.00
Volume (gallons):		88,128.09
Turnovers:		5.28
Net Throughput(gal/yr):		465,000.00
Is Tank Heated (y/n):	N	
Paint Characteristics		
Shell Color/Shade:	Gray/Light	
Shell Condition	Good	
Roof Color/Shade:	Gray/Light	
Roof Condition:	Good	
Roof Characteristics		
Type:	Cone	
Height (ft)		1.00
Slope (ft/ft) (Cone Roof)		0.08
Breather Vent Settings		
Vacuum Settings (psig):		-0.03
Pressure Settings (psig)		0.03

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Not VOC - T-568 - Vertical Fixed Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
58% Ammonium Thiosulfate/42% Water	All	57.39	44.50	70.27	50.84	0.2559	0.1881	0.3690	47.2336			36.70	
Ammonium Thiosulfate						0.4000	0.4000	0.4000	148.2000	0.5800	0.7045	148.20	Option 1: VP50 = .4 VP60 = .4
Water						0.2317	0.1525	0.3638	18.0000	0.4200	0.2955	18.00	Option 1: VP50 = .18 VP60 = .25

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Not VOC - T-568 - Vertical Fixed Roof Tank
Gallup, NM

Annual Emission Calcaulations

Standing Losses (lb):	456.2381
Vapor Space Volume (cu ft):	6,054.1108
Vapor Density (lb/cu ft):	0.0022
Vapor Space Expansion Factor:	0.1106
Vented Vapor Saturation Factor:	0.8567
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	6,054.1108
Tank Diameter (ft):	25.0000
Vapor Space Outage (ft):	12.3333
Tank Shell Height (ft):	24.0000
Average Liquid Height (ft):	12.0000
Roof Outage (ft):	0.3333
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.3333
Roof Height (ft):	1.0000
Roof Slope (ft/ft):	0.0800
Shell Radius (ft):	12.5000
Vapor Density	
Vapor Density (lb/cu ft):	0.0022
Vapor Molecular Weight (lb/lb-mole):	47.2336
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.2559
Daily Avg. Liquid Surface Temp. (deg. R):	517.0582
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	510.5100
Tank Paint Solar Absorptance (Shell):	0.5400
Tank Paint Solar Absorptance (Roof):	0.5400
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.1106
Daily Vapor Temperature Range (deg. R):	51.5419
Daily Vapor Pressure Range (psia):	0.1810
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.2559
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.1881
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.3690
Daily Avg. Liquid Surface Temp. (deg R):	517.0582
Daily Min. Liquid Surface Temp. (deg R):	504.1727
Daily Max. Liquid Surface Temp. (deg R):	529.9436
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.8567
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.2559
Vapor Space Outage (ft):	12.3333
Working Losses (lb):	133.8151
Vapor Molecular Weight (lb/lb-mole):	47.2336
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.2559
Annual Net Throughput (gal/yr.):	465,000.0000
Annual Turnovers:	5.2764
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	88,128.0857
Maximum Liquid Height (ft):	24.0000
Tank Diameter (ft):	25.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	590.0532

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

Not VOC - T-568 - Vertical Fixed Roof Tank
Gallup, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
58% Ammonium Thiosulfate/42% Water	133.82	456.24	590.05
Ammonium Thiosulfate	94.27	321.41	415.68
Water	39.55	134.83	174.37

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T-569
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	External Floating Roof Tank
Description:	Low-octane base gasoline

Tank Dimensions

Diameter (ft):	67.00
Volume (gallons):	1,050,000.00
Turnovers:	40.00

Paint Characteristics

Internal Shell Condition:	Light Rust
Shell Color/Shade:	Gray/Light
Shell Condition	Good

Roof Characteristics

Type:	Double Deck
Fitting Category	Detail

Tank Construction and Rim-Seal System

Construction:	Welded
Primary Seal:	Mechanical Shoe
Secondary Seal	Rim-mounted

Deck Fitting/Status	Quantity
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1
Automatic Gauge Float Well/Unbolted Cover, Ungasketed	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Ungask.	1
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Ungask.	1
Roof Drain (3-in. Diameter)/Open	1
Roof Leg (3-in. Diameter)/Adjustable, Double-Deck Roofs	13
Roof Drain (3-in. Diameter)/90% Closed	1

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-569 - External Floating Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Gasoline (83 Oct. Base) - Ciniza	All	57.39	44.50	70.27	50.84	4.7329	N/A	N/A	67.0000			93.00	Option 4: RVP=9.8, ASTM Slope=2.5
1,2,4-Trimethylbenzene						0.0184	N/A	N/A	120.1900	0.0191	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
1-Pentene						8.2062	N/A	N/A	70.1400	0.0019	0.0046	70.14	Option 2: A=6.8442, B=1044.01, C=233.5
2-Methyl-1-butene						4.2310	N/A	N/A	70.1300	0.0042	0.0052	70.13	Option 2: A=6.4863, B=1039.69, C=236.65
2-Pentene						6.1082	N/A	N/A	70.1400	0.0082	0.0147	70.14	Option 1: VP50 = 5 VP60 = 6.5
Benzene						1.0858	N/A	N/A	78.1100	0.0270	0.0086	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.1282	N/A	N/A	84.1600	0.0187	0.0062	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0990	N/A	N/A	106.1700	0.0112	0.0003	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.7870	N/A	N/A	86.1700	0.0504	0.0264	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopentane						9.4523	N/A	N/A	72.1500	0.1119	0.3102	72.15	Option 1: VP50 = 7.889 VP60 = 10.005
Isopropyl benzene						0.0463	N/A	N/A	120.2000	0.0007	0.0000	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Naphthalene						0.0022	N/A	N/A	128.0000	0.0023	0.0000	128.00	Option 1: VP50 = .0015 VP60 = .0024
Pentane (-n)						6.4487	N/A	N/A	72.1500	0.0637	0.1205	72.15	Option 3: A=27691, B=7.558
Phenol						0.0065	N/A	N/A	94.0000	0.0006	0.0000	94.00	Option 1: VP50 = .005 VP60 = .007
Toluene						0.3042	N/A	N/A	92.1300	0.0742	0.0066	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						5.2345	N/A	N/A	61.6704	0.5386	0.4950	103.01	
Xylene (-m)						0.0824	N/A	N/A	106.1700	0.0674	0.0016	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T-569 - External Floating Roof Tank
Gallup, NM

Annual Emission Calcaulations

Rim Seal Losses (lb):	3,220.5605
Seal Factor A (lb-mole/ft-yr):	0.6000
Seal Factor B (lb-mole/ft-yr (mph)^n):	0.4000
Average Wind Speed (mph):	11.8000
Seal-related Wind Speed Exponent:	1.0000
Value of Vapor Pressure Function:	0.1349
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	4.7329
Tank Diameter (ft):	67.0000
Vapor Molecular Weight (lb/lb-mole):	67.0000
Product Factor:	1.0000
Withdrawal Losses (lb):	122.4493
Annual Net Throughput (gal/yr.):	42,000,000.0000
Shell Clingage Factor (bbl/1000 sqft):	0.0015
Average Organic Liquid Density (lb/gal):	5.8000
Tank Diameter (ft):	67.0000
Roof Fitting Losses (lb):	1,226.3064
Value of Vapor Pressure Function:	0.1349
Vapor Molecular Weight (lb/lb-mole):	67.0000
Product Factor:	1.0000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	135.7232
Average Wind Speed (mph):	11.8000
Total Losses (lb):	4,569.3161

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors KFa(lb-mole/yr)	KFb(lb-mole/(yr mph^n))	m	Losses(lb)
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1	1.60	0.00	0.00	14.4566
Automatic Gauge Float Well/Unbolted Cover, Ungasketed	1	14.00	5.40	1.10	624.2513
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	134.9211
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Ungask.	1	0.68	1.80	1.00	140.4816
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Ungask.	1	2.30	0.00	0.00	20.7813
Roof Drain (3-in. Diameter)/Open	1	1.50	0.21	1.70	82.2647
Roof Leg (3-in. Diameter)/Adjustable, Double-Deck Roofs	13	0.82	0.53	0.14	179.9814
Roof Drain (3-in. Diameter)/90% Closed	1	1.80	0.14	1.10	29.1684

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-569 - External Floating Roof Tank
Gallup, NM

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Gasoline (83 Oct. Base) - Ciniza	3,220.56	122.45	1,226.31	0.00	4,569.32
Isopentane	999.04	13.70	380.41	0.00	1,393.15
1-Pentene	14.73	0.23	5.61	0.00	20.57
2-Methyl-1-butene	16.78	0.51	6.39	0.00	23.69
Pentane (-n)	388.00	7.80	147.74	0.00	543.53
2-Pentene	47.31	1.00	18.01	0.00	66.33
Hexane (-n)	85.07	6.17	32.39	0.00	123.63
Benzene	27.69	3.31	10.54	0.00	41.54
Cyclohexane	19.93	2.29	7.59	0.00	29.80
Toluene	21.32	9.09	8.12	0.00	38.52
Ethylbenzene	1.05	1.37	0.40	0.00	2.82
Xylene (-m)	5.25	8.25	2.00	0.00	15.50
Isopropyl benzene	0.03	0.09	0.01	0.00	0.13
1,2,4-Trimethylbenzene	0.33	2.34	0.13	0.00	2.80
Naphthalene	0.00	0.28	0.00	0.00	0.29
Phenol	0.00	0.07	0.00	0.00	0.07
Unidentified Components	1,594.04	65.95	606.97	0.00	2,266.96

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T-570
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	External Floating Roof Tank
Description:	Mid-octane base gasoline

Tank Dimensions

Diameter (ft):	67.00
Volume (gallons):	1,050,000.00
Turnovers:	50.48

Paint Characteristics

Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition	Good

Roof Characteristics

Type:	Double Deck
Fitting Category	Detail

Tank Construction and Rim-Seal System

Construction:	Welded
Primary Seal:	Mechanical Shoe
Secondary Seal	Rim-mounted

Deck Fitting/Status	**Quantity**
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1
Automatic Gauge Float Well/Unbolted Cover, Ungasketed	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Ungask.	1
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Ungask.	1
Roof Drain (3-in. Diameter)/Open	1
Roof Leg (3-in. Diameter)/Adjustable, Double-Deck Roofs	13
Roof Drain (3-in. Diameter)/90% Closed	1

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-570 - External Floating Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Gasoline (87 Oct. Base) - Ciniza	All	50.98	42.67	59.29	48.62	4.1571	N/A	N/A	67.0000			95.00	Option 4: RVP=9.8, ASTM Slope=2.5
1,2,4-Trimethylbenzene						0.0141	N/A	N/A	120.1900	0.0226	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
1-Pentene						7.1230	N/A	N/A	70.1400	0.0019	0.0046	70.14	Option 2: A=6.8442, B=1044.01, C=233.5
2,2,4-Trimethylpentane						0.4568	N/A	N/A	114.2300	0.0134	0.0021	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
2-Methyl-1-butene						3.6877	N/A	N/A	70.1300	0.0043	0.0054	70.13	Option 2: A=6.4863, B=1039.69, C=236.65
2-Pentene						5.1474	N/A	N/A	70.1400	0.0081	0.0142	70.14	Option 1: VP50 = 5 VP60 = 6.5
Benzene						0.9046	N/A	N/A	78.1100	0.0247	0.0076	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.9439	N/A	N/A	84.1600	0.0100	0.0032	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0787	N/A	N/A	106.1700	0.0094	0.0003	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.5057	N/A	N/A	86.1700	0.0219	0.0112	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopentane						8.0970	N/A	N/A	72.1500	0.1522	0.4203	72.15	Option 1: VP50 = 7.889 VP60 = 10.005
Isopropyl benzene						0.0362	N/A	N/A	120.2000	0.0008	0.0000	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Naphthalene						0.0016	N/A	N/A	128.0000	0.0026	0.0000	128.00	Option 1: VP50 = .0015 VP60 = .0024
Pentane (-n)						5.5760	N/A	N/A	72.1500	0.0329	0.0626	72.15	Option 3: A=27691, B=7.558
Phenol						0.0052	N/A	N/A	94.0000	0.0006	0.0000	94.00	Option 1: VP50 = .005 VP60 = .007
Toluene						0.2478	N/A	N/A	92.1300	0.0532	0.0045	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.1511	N/A	N/A	61.3341	0.5626	0.4620	105.73	
Xylene (-m)						0.0654	N/A	N/A	106.1700	0.0789	0.0018	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T-570 - External Floating Roof Tank
Gallup, NM

Annual Emission Calcaulations

Rim Seal Losses (lb):	2,726.5469
Seal Factor A (lb-mole/ft-yr):	0.6000
Seal Factor B (lb-mole/ft-yr (mph)^n):	0.4000
Average Wind Speed (mph):	11.8000
Seal-related Wind Speed Exponent:	1.0000
Value of Vapor Pressure Function:	0.1142
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	4.1571
Tank Diameter (ft):	67.0000
Vapor Molecular Weight (lb/lb-mole):	67.0000
Product Factor:	1.0000
Withdrawal Losses (lb):	155.0521
Annual Net Throughput (gal/yr.):	53,000,000.0000
Shell Clingage Factor (bbl/1000 sqft):	0.0015
Average Organic Liquid Density (lb/gal):	5.8200
Tank Diameter (ft):	67.0000
Roof Fitting Losses (lb):	1,038.1987
Value of Vapor Pressure Function:	0.1142
Vapor Molecular Weight (lb/lb-mole):	67.0000
Product Factor:	1.0000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	135.7232
Average Wind Speed (mph):	11.8000
Total Losses (lb):	3,919.7978

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors KFa(lb-mole/yr)	KFb(lb-mole/(yr mph^n))	m	Losses(lb)
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1	1.60	0.00	0.00	12.2390
Automatic Gauge Float Well/Unbolted Cover, Ungasketed	1	14.00	5.40	1.10	528.4951
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	114.2250
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Ungask.	1	0.68	1.80	1.00	118.9326
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Ungask.	1	2.30	0.00	0.00	17.5936
Roof Drain (3-in. Diameter)/Open	1	1.50	0.21	1.70	69.6458
Roof Leg (3-in. Diameter)/Adjustable, Double-Deck Roofs	13	0.82	0.53	0.14	152.3734
Roof Drain (3-in. Diameter)/90% Closed	1	1.80	0.14	1.10	24.6942

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-570 - External Floating Roof Tank
Gallup, NM

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Gasoline (87 Oct. Base) - Ciniza	2,726.55	155.05	1,038.20	0.00	3,919.80
Isopentane	1,146.07	23.60	436.40	0.00	1,606.07
1-Pentene	12.59	0.29	4.79	0.00	17.67
2-Methyl-1-butene	14.75	0.67	5.62	0.00	21.03
Pentane (-n)	170.60	5.10	64.96	0.00	240.67
2-Pentene	38.77	1.26	14.76	0.00	54.80
Hexane (-n)	30.67	3.40	11.68	0.00	45.74
Benzene	20.78	3.83	7.91	0.00	32.52
Cyclohexane	8.78	1.55	3.34	0.00	13.67
2,2,4-Trimethylpentane	5.69	2.08	2.17	0.00	9.94
Toluene	12.26	8.25	4.67	0.00	25.18
Ethylbenzene	0.69	1.46	0.26	0.00	2.41
Xylene (-m)	4.80	12.23	1.83	0.00	18.86
Isopropyl benzene	0.03	0.12	0.01	0.00	0.16
1,2,4-Trimethylbenzene	0.30	3.50	0.11	0.00	3.91
Naphthalene	0.00	0.40	0.00	0.00	0.41
Phenol	0.00	0.09	0.00	0.00	0.09
Unidentified Components	1,259.77	87.22	479.69	0.00	1,826.68

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T-571
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	External Floating Roof Tank
Description:	Mid-octane base gasoline

Tank Dimensions

Diameter (ft):	67.00
Volume (gallons):	1,050,000.00
Turnovers:	50.48

Paint Characteristics

Internal Shell Condition:	Light Rust
Shell Color/Shade:	Gray/Light
Shell Condition	Good

Roof Characteristics

Type:	Double Deck
Fitting Category	Detail

Tank Construction and Rim-Seal System

Construction:	Welded
Primary Seal:	Mechanical Shoe
Secondary Seal	Rim-mounted

Deck Fitting/Status	**Quantity**
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1
Automatic Gauge Float Well/Unbolted Cover, Ungasketed	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Ungask.	1
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Ungask.	1
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Ungask.	1
Roof Drain (3-in. Diameter)/Open	1
Roof Leg (3-in. Diameter)/Adjustable, Double-Deck Roofs	13
Roof Drain (3-in. Diameter)/90% Closed	1

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-571 - External Floating Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Gasoline (87 Oct. Base) - Ciniza	All	57.39	44.50	70.27	50.84	4.7329	N/A	N/A	67.0000			95.00	Option 4: RVP=9.8, ASTM Slope=2.5
1,2,4-Trimethylbenzene						0.0184	N/A	N/A	120.1900	0.0226	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
1-Pentene						8.2062	N/A	N/A	70.1400	0.0019	0.0047	70.14	Option 2: A=6.8442, B=1044.01, C=233.5
2,2,4-Trimethylpentane						0.5522	N/A	N/A	114.2300	0.0134	0.0022	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
2-Methyl-1-butene						4.2310	N/A	N/A	70.1300	0.0043	0.0055	70.13	Option 2: A=6.4863, B=1039.69, C=236.65
2-Pentene						6.1082	N/A	N/A	70.1400	0.0081	0.0148	70.14	Option 1: VP50 = 5 VP60 = 6.5
Benzene						1.0858	N/A	N/A	78.1100	0.0247	0.0080	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.1282	N/A	N/A	84.1600	0.0100	0.0034	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0990	N/A	N/A	106.1700	0.0094	0.0003	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.7870	N/A	N/A	86.1700	0.0219	0.0117	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopentane						9.4523	N/A	N/A	72.1500	0.1522	0.4310	72.15	Option 1: VP50 = 7.889 VP60 = 10.005
Isopropyl benzene						0.0463	N/A	N/A	120.2000	0.0008	0.0000	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Naphthalene						0.0022	N/A	N/A	128.0000	0.0026	0.0000	128.00	Option 1: VP50 = .0015 VP60 = .0024
Pentane (-n)						6.4487	N/A	N/A	72.1500	0.0329	0.0636	72.15	Option 3: A=27691, B=7.558
Phenol						0.0065	N/A	N/A	94.0000	0.0006	0.0000	94.00	Option 1: VP50 = .005 VP60 = .007
Toluene						0.3042	N/A	N/A	92.1300	0.0532	0.0048	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.6061	N/A	N/A	61.0099	0.5626	0.4479	105.73	
Xylene (-m)						0.0824	N/A	N/A	106.1700	0.0789	0.0019	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T-571 - External Floating Roof Tank
Gallup, NM

Annual Emission Calcaulations	
Rim Seal Losses (lb):	3,220.5605
Seal Factor A (lb-mole/ft-yr):	0.6000
Seal Factor B (lb-mole/ft-yr (mph)^n):	0.4000
Average Wind Speed (mph):	11.8000
Seal-related Wind Speed Exponent:	1.0000
Value of Vapor Pressure Function:	0.1349
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	4.7329
Tank Diameter (ft):	67.0000
Vapor Molecular Weight (lb/lb-mole):	67.0000
Product Factor:	1.0000
Withdrawal Losses (lb):	155.0521
Annual Net Throughput (gal/yr.):	53,000,000.0000
Shell Clingage Factor (bbl/1000 sqft):	0.0015
Average Organic Liquid Density (lb/gal):	5.8200
Tank Diameter (ft):	67.0000
Roof Fitting Losses (lb):	1,582.4571
Value of Vapor Pressure Function:	0.1349
Vapor Molecular Weight (lb/lb-mole):	67.0000
Product Factor:	1.0000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	175.1406
Average Wind Speed (mph):	11.8000
Total Losses (lb):	4,958.0697

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors KFa(lb-mole/yr)	KFb(lb-mole/(yr mph^n))	m	Losses(lb)
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1	1.60	0.00	0.00	14.4566
Automatic Gauge Float Well/Unbolted Cover, Ungasketed	1	14.00	5.40	1.10	624.2513
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Ungask.	1	7.80	0.01	4.00	491.0718
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Ungask.	1	0.68	1.80	1.00	140.4816
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Ungask.	1	2.30	0.00	0.00	20.7813
Roof Drain (3-in. Diameter)/Open	1	1.50	0.21	1.70	82.2647
Roof Leg (3-in. Diameter)/Adjustable, Double-Deck Roofs	13	0.82	0.53	0.14	179.9814
Roof Drain (3-in. Diameter)/90% Closed	1	1.80	0.14	1.10	29.1684

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-571 - External Floating Roof Tank
Gallup, NM

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Gasoline (87 Oct. Base) - Ciniza	3,220.56	155.05	1,582.46	0.00	4,958.07
Isopentane	1,388.06	23.60	682.04	0.00	2,093.69
1-Pentene	15.04	0.29	7.39	0.00	22.73
2-Methyl-1-butene	17.55	0.67	8.63	0.00	26.85
Pentane (-n)	204.70	5.10	100.58	0.00	310.39
2-Pentene	47.74	1.26	23.46	0.00	72.45
Hexane (-n)	37.76	3.40	18.55	0.00	59.71
Benzene	25.88	3.83	12.71	0.00	42.42
Cyclohexane	10.89	1.55	5.35	0.00	17.78
2,2,4-Trimethylpentane	7.14	2.08	3.51	0.00	12.73
Toluene	15.61	8.25	7.67	0.00	31.54
Ethylbenzene	0.90	1.46	0.44	0.00	2.80
Xylene (-m)	6.27	12.23	3.08	0.00	21.59
Isopropyl benzene	0.04	0.12	0.02	0.00	0.18
1,2,4-Trimethylbenzene	0.40	3.50	0.20	0.00	4.10
Naphthalene	0.01	0.40	0.00	0.00	0.41
Phenol	0.00	0.09	0.00	0.00	0.09
Unidentified Components	1,442.58	87.22	708.83	0.00	2,238.63

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T-572
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	External Floating Roof Tank
Description:	Mid-octane base gasoline

Tank Dimensions

Diameter (ft):	67.00
Volume (gallons):	1,050,000.00
Turnovers:	50.48

Paint Characteristics

Internal Shell Condition:	Light Rust
Shell Color/Shade:	Gray/Light
Shell Condition	Good

Roof Characteristics

Type:	Double Deck
Fitting Category	Detail

Tank Construction and Rim-Seal System

Construction:	Welded
Primary Seal:	Mechanical Shoe
Secondary Seal	Rim-mounted

Deck Fitting/Status	Quantity
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1
Automatic Gauge Float Well/Unbolted Cover, Ungasketed	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Ungask.	1
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Ungask.	1
Roof Drain (3-in. Diameter)/Open	1
Roof Leg (3-in. Diameter)/Adjustable, Double-Deck Roofs	13
Roof Drain (3-in. Diameter)/90% Closed	1

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-572 - External Floating Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Gasoline (87 Oct. Base) - Ciniza	All	57.39	44.50	70.27	50.84	4.7329	N/A	N/A	67.0000			95.00	Option 4: RVP=9.8, ASTM Slope=2.5
1,2,4-Trimethylbenzene						0.0184	N/A	N/A	120.1900	0.0226	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
1-Pentene						8.2062	N/A	N/A	70.1400	0.0019	0.0047	70.14	Option 2: A=6.8442, B=1044.01, C=233.5
2,2,4-Trimethylpentane						0.5522	N/A	N/A	114.2300	0.0134	0.0022	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
2-Methyl-1-butene						4.2310	N/A	N/A	70.1300	0.0043	0.0055	70.13	Option 2: A=6.4863, B=1039.69, C=236.65
2-Pentene						6.1082	N/A	N/A	70.1400	0.0081	0.0148	70.14	Option 1: VP50 = 5 VP60 = 6.5
Benzene						1.0858	N/A	N/A	78.1100	0.0247	0.0080	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.1282	N/A	N/A	84.1600	0.0100	0.0034	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0990	N/A	N/A	106.1700	0.0094	0.0003	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.7870	N/A	N/A	86.1700	0.0219	0.0117	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopentane						9.4523	N/A	N/A	72.1500	0.1522	0.4310	72.15	Option 1: VP50 = 7.889 VP60 = 10.005
Isopropyl benzene						0.0463	N/A	N/A	120.2000	0.0008	0.0000	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Naphthalene						0.0022	N/A	N/A	128.0000	0.0026	0.0000	128.00	Option 1: VP50 = .0015 VP60 = .0024
Pentane (-n)						6.4487	N/A	N/A	72.1500	0.0329	0.0636	72.15	Option 3: A=27691, B=7.558
Phenol						0.0065	N/A	N/A	94.0000	0.0006	0.0000	94.00	Option 1: VP50 = .005 VP60 = .007
Toluene						0.3042	N/A	N/A	92.1300	0.0532	0.0048	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.6061	N/A	N/A	61.0099	0.5626	0.4479	105.73	
Xylene (-m)						0.0824	N/A	N/A	106.1700	0.0789	0.0019	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T-572 - External Floating Roof Tank
Gallup, NM

Annual Emission Calcaulations

Rim Seal Losses (lb):	3,220.5605
Seal Factor A (lb-mole/ft-yr):	0.6000
Seal Factor B (lb-mole/ft-yr (mph)^n):	0.4000
Average Wind Speed (mph):	11.8000
Seal-related Wind Speed Exponent:	1.0000
Value of Vapor Pressure Function:	0.1349
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	4.7329
Tank Diameter (ft):	67.0000
Vapor Molecular Weight (lb/lb-mole):	67.0000
Product Factor:	1.0000
Withdrawal Losses (lb):	155.0521
Annual Net Throughput (gal/yr.):	53,000,000.0000
Shell Clingage Factor (bbl/1000 sqft):	0.0015
Average Organic Liquid Density (lb/gal):	5.8200
Tank Diameter (ft):	67.0000
Roof Fitting Losses (lb):	1,226.3064
Value of Vapor Pressure Function:	0.1349
Vapor Molecular Weight (lb/lb-mole):	67.0000
Product Factor:	1.0000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	135.7232
Average Wind Speed (mph):	11.8000
Total Losses (lb):	4,601.9190

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors KFa(lb-mole/yr)	KFb(lb-mole/(yr mph^n))	m	Losses(lb)
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1	1.60	0.00	0.00	14.4566
Automatic Gauge Float Well/Unbolted Cover, Ungasketed	1	14.00	5.40	1.10	624.2513
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	134.9211
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Ungask.	1	0.68	1.80	1.00	140.4816
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Ungask.	1	2.30	0.00	0.00	20.7813
Roof Drain (3-in. Diameter)/Open	1	1.50	0.21	1.70	82.2647
Roof Leg (3-in. Diameter)/Adjustable, Double-Deck Roofs	13	0.82	0.53	0.14	179.9814
Roof Drain (3-in. Diameter)/90% Closed	1	1.80	0.14	1.10	29.1684

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-572 - External Floating Roof Tank
Gallup, NM

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Gasoline (87 Oct. Base) - Ciniza	3,220.56	155.05	1,226.31	0.00	4,601.92
Isopentane	1,388.06	23.60	528.54	0.00	1,940.19
1-Pentene	15.04	0.29	5.73	0.00	21.07
2-Methyl-1-butene	17.55	0.67	6.68	0.00	24.90
Pentane (-n)	204.70	5.10	77.95	0.00	287.75
2-Pentene	47.74	1.26	18.18	0.00	67.17
Hexane (-n)	37.76	3.40	14.38	0.00	55.53
Benzene	25.88	3.83	9.85	0.00	39.56
Cyclohexane	10.89	1.55	4.14	0.00	16.58
2,2,4-Trimethylpentane	7.14	2.08	2.72	0.00	11.94
Toluene	15.61	8.25	5.95	0.00	29.81
Ethylbenzene	0.90	1.46	0.34	0.00	2.70
Xylene (-m)	6.27	12.23	2.39	0.00	20.89
Isopropyl benzene	0.04	0.12	0.01	0.00	0.17
1,2,4-Trimethylbenzene	0.40	3.50	0.15	0.00	4.06
Naphthalene	0.01	0.40	0.00	0.00	0.41
Phenol	0.00	0.09	0.00	0.00	0.09
Unidentified Components	1,442.58	87.22	549.30	0.00	2,079.10

Floating Roof Tank Emissions

Reporting Year	*2018*

Based on AP-42, November 2006, Section 7.1.3.2.

Tool Last Updated: 12/14/15 *Click Here to Go Back to Cover Page*

Tank Reference Parameters

Parameter Title	Notes	Parameter Symbol	Units	Value
Tank ID	Enter only Tank ID in this tab.			T-574
Tank Name		TK_{name}		T-574
Actual Location		Loc_{Act}		Gallup, NM
Location for Calculation Purposes		Loc_{Calc}		Gallup, NM
Tank Roof Type		TK_{roof}		EFR - Double-Deck
Normal Capacity		Cap	gal	1,680,000
Diameter		D	ft	85.0
Shell Height or Length		H_S	ft	40.0
External Shell Color		SC_{ext}		Tan
External Shell Paint Condition		PC_{Shell}		Good
Roof Color/Shade		RC		Tan
Roof Paint Condition		PC_{Roof}		Good
Tank Shell Solar Absorbance		α_{Shell}		0.43
Tank Roof Paint Solar Absorbance		α_{Roof}		0.43
Total Tank Paint Solar Absorbance	= $(\alpha_{Shell} + \alpha_{Roof}) / 2$ {Note A, Table 7.1-6}	α_{Tot}		0.43
Ideal Gas Constant,		R	psia ft^3 / lbmole °R	10.731
Ambient Pressure		P_A	psia	11.300
Rim-Seal System		$TK_{RimSeal}$		Mechanical-shoe/Rim-mounted
Tank Fittings		$TK_{Fittings}$		Detail

Floating Roof Parameters

Parameter Title	Notes	Parameter Symbol	Units	Value
Heated Tank?		HT		No
Liquid Bulk Temperature	Heated Tanks Only	T_B	Degrees F	--
Number of fixed roof support columns		N_{Col}		0
Effective Column Diameter	1.1 for 9" by 7" built-up column 0.7 for 8" diameter pipe column 1.0 for unknown pipe column	F_C	(col perimeter/π) ft	1.0
Internal Shell Condition		SC_{int}		Light Rust
Tank Construction		TK_{Const}		Welded
Deck Type		TK_{Deck}		--
Total Length of Deck Seams		L_{Seam}	ft	--
Area of deck	= π * D^2 / 4 {Eqn. 2-9}	A_{deck}	ft^2	5,674.5
Deck Seam Length Factor	= L_{Seam} / A_{deck} {Eqn. 2-9} = 0.20 ft/ft^2 {5' wide sheet} = 0.17 ft/ft^2 {6' wide sheet} = 0.14 ft/ft^2 {7' wide sheet} = 0.33 ft/ft^2 {5' x 7.5' panels} = 0.28 ft/ft^2 {5' 12' panels} = 0.20 ft/ft^2 {most common type}	S_D	ft/ft^2	--
Deck Construction (IFR w/Bolted Decks Only)	Not applicable if L_{Seam} specified.	$TK_{DeckConst}$		--
Zero wind speed rim seal loss factor	AP-42 Table 7.1-8	K_{RA}	lb-mole/ft-yr	0.6
Wind speed dependent rim seal loss factor	AP-42 Table 7.1-8	K_{RB}	lb-mole/$(mph)^n$-ft-yr	0.4
Fitting Wind Speed Correction Factor	= 0.7 {EFR Tanks Only} = 0.0 {IFR and Domed EFR Tanks Only} {Eqn. 2-7}	K_V		0.7
Seal related wind speed exponent		n		1.0
Days per Year	For leap years, days = 366	t_{yr}	days/yr	365

Emission Summary

Month	Normal Operation Loss, lbs	Emissions, tpy
Annual Throughput, gal	**29,700,000**	**Annual Turnovers: 17.68**
Annual Emissions, tons	**3.76**	
Jan	386.78	0.193
Feb	411.64	0.206
Mar	572.65	0.286
Apr	696.71	0.348
May	658.75	0.329
Jun	932.39	0.466
Jul	897.35	0.449
Aug	831.60	0.416
Sep	747.21	0.374
Oct	624.25	0.312
Nov	415.43	0.208
Dec	351.22	0.1756

Note: The emission summary table is pulled into the Tank Emissions tab using cell references A31:B42. The emission summary must remain at this cell reference to function properly.

Calculations					1	2	3	4	5	6	7	8	9
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Reference or Equation**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**
Service					**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil				Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):			= User specified	LSR Naphtha 11	LSR Naphtha 11	LSR Naphtha 11	LSR Naphtha 11	LSR Naphtha 10	LSR Naphtha 10	LSR Naphtha 10	LSR Naphtha 10	LSR Naphtha 10
Speciation Profile	Select from list (add new in 'Speciation Input' tab):			= User specified	Naphtha - Ciniza	Naphtha - Ciniza	Naphtha - Ciniza	Naphtha - Ciniza	Naphtha - Ciniza	Naphtha - Ciniza	Naphtha - Ciniza	Naphtha - Ciniza	Naphtha - Ciniza
Speciation Profile Type				= User specified	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation
Monthly Throughput		Q	gal/month	= User specified	2,475,000	2,475,000	2,475,000	2,475,000	2,475,000	2,475,000	2,475,000	2,475,000	2,475,000
Days-In-Service	Input "0" for OOS	t_{IS}	days	= User specified	31	28	31	30	31	30	31	31	30
Shell Clingage Factor		C_S	bbl / 1000 ft^2	{Table 7.1-10}	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015
Total Deck Fitting Loss Factor	Eqn. 2-6	F_F	lb-mole/yr	= [(N_{F1} * K_{F1}) + (N_{F2} * K_{F2}) + … + (N_{Fnf} * K_{Fnf})] {Eqn. 2-6}	135.4	135.4	141.6	154.6	141.6	140.2	127.9	121.0	133.4
Daily Total Solar Insolation Factor		I	Btu / ft^2 day		1,020	1,320	1,710	2,170	2,440	2,570	2,390	2,190	1,860
Product Factor	Eqn. 2-3	K_C		= 0.4 {crude oils} = 1.0 {all other org. liquids}	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Deck Seam Loss per Unit Seam Length Factor	Converted K_D into monthly emissions by scaling by the time in service for the month.	K_D	lb-mole / ft-month	= 0.0 {IFR Tank with welded deck and all EFR Tanks} = 0.14 * t_{IS} / t_{yr} {bolted deck}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Vapor Molecular Weight		M_V	lb/lb-mole	= VOL data of tank contents {partial speciation} M_V = Σ (M_{Vi} * ($P_{VA,Tla-i}$/$P_{VA,Tla}$))	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0
Liquid Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M of each component.	M_L	lb/lb-mole	M_L = 1 / Σ (Z_{Li} / M_{Li}) {full speciation, Eqn. 1-22}	108.0	108.0	108.0	108.0	108.0	108.0	108.0	108.0	108.0
Liquid Density at 60 °F		W_L	lb/gal	= VOL data of tank contents {partial speciation} = Σ ($M_{L,i}$ * Z_{Li}) {full speciation, Eqn. 1-22}	6.30	6.30	6.30	6.30	6.30	6.30	6.30	6.30	6.30
Average Daily Minimum Ambient Temperature		T_{AN}	°F		20.50	21.70	26.10	29.30	37.20	47.80	54.10	52.50	45.30
Average Daily Maximum Ambient Temperature		T_{AX}	°F		46.90	56.70	63.00	65.30	68.90	86.00	84.70	87.80	82.60
Daily Average Ambient Temperature		T_{AA}	°F	= (T_{AX} + T_{AN}) / 2 {Eqn. 1-27}	33.70	39.20	44.55	47.30	53.05	66.90	69.40	70.15	63.95
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	T_{LA}	°F	= (0.44 * T_{AA}) + (0.56 * T_B) + (0.0079 * α_{Tot} * I) {Eqn. 1-26}	38.05	44.57	51.24	55.56	62.22	76.52	78.40	78.47	71.15
Liquid Bulk Temperature	If T_B is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated.	T_B	degrees F	= specified by user {heated tanks only} = T_{AA} + 6 * α_{Tot} - 1 {Eqn. 1-28}	35.28	40.78	46.13	48.88	54.63	68.48	70.98	71.73	65.53
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	$P_{VA,Tla}$	psia	*{full speciation profiles, Eqn. 1-22}:* Sum of partial true vapor pressures components. *{partial/no speciation profiles}:* Vapor pressures at T (°F) based on P_{VA} values in VOLs	3.8047	4.3417	4.9528	5.3829	5.4944	7.1476	7.3927	7.4020	6.4867
Vapor Pressure at Daily Av. Liquid Bulk Temp.	Used for vapor space expansion factor. $P_{VA,Tb}$ uses T_B.	$P_{VA,Tb}$	psia	tab at ΔT (°F) increments by interpolating between the P_{VA} values at the next highest/lowest T. $P_{VA,T}$ = (T - T_{Low}) / (T_{High} - T_{Low}) * ($P_{VA,T,High}$ - $P_{VA,T,Low}$) + $P_{VA,T,Low}$	3.5934	4.0227	4.4789	4.7290	4.7494	6.1758	6.4661	6.5553	5.8466
Vapor Pressure Function	Use T_B for calculating P_{VA} per Eqn. 2-3 Note 3.	P_f		= ($P_{VA,Tb}$ / P_A) / (1 + (1 - $P_{VA,Tb}$ / $P_A)^{0.5}$)^2 {Eqn. 2-3}	0.1023	0.1206	0.1432	0.1603	0.1650	0.2452	0.2594	0.2600	0.2102
Average Ambient Wind Speed	Monthly Average	v	mph	= 0 {Domed EFR and all IFR tanks, Eqn. 2-3 Note 3}	11.7	11.7	12.6	14.5	12.6	12.4	10.6	9.6	11.4
Rim Seal Loss		L_R	lb/month	= (K_{Ra} + K_{Rb} * v^n) * D * P_f * M_V * K_C * t_{IS} / t_{yr} {Eqn. 2-2}	292.38	311.48	437.31	537.70	503.78	714.28	679.83	624.98	568.24
Withdrawal Loss	Constant 0.943 has units of (1,000 ft^3 gal / bbl^2)	L_{WD}	lb/month	= 0.943 * (Q / (42 gal/bbl)) * C_S * W_L / D * (1 + (N_{Col} * F_C / D)) {Eqn. 2-4}	6.18	6.18	6.18	6.18	6.18	6.18	6.18	6.18	6.18
Deck Fitting Loss		L_F	lb/month	= F_F * P_f * M_V * K_C * t_{IS} / t_{yr} {Eqn 2-5}	88.22	93.99	129.16	152.84	148.79	211.93	211.34	200.44	172.79
Deck Seam Loss		L_D	lb/month	= 0 {welded IFR and all EFR tanks} = K_D * S_D * D^2 * P_f * M_V * K_C {Eqn. 2-9}	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Emission from Normal Operation		**L_T**	**lb/month**	**= L_R + L_{WD} + L_F + L_D {Eqn. 2-1}**	**386.78**	**411.64**	**572.65**	**696.71**	**658.75**	**932.39**	**897.35**	**831.60**	**747.21**

	Calculatio	10	11	12	1	2	3	4	5	6	7	8	9
Parameter Title	**Notes**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**
Service		**Main Service**	**Main Service**	**Main Service**	**Service Change**	**Service Change**	**Service Change**	**Service Change**	**Service Change**	**Service Change**	**Service Change**	**Service Change**	**Service Change**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	--	--	--	--	--	--	--	--	--
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):	LSR Naphtha 11	LSR Naphtha 11	LSR Naphtha 11	No Service Change	No Service Change	No Service Change	No Service Change	No Service Change	No Service Change	No Service Change	No Service Change	No Service Change
Speciation Profile	Select from list (add new in 'Speciation Input' tab):	Naphtha - Ciniza	Naphtha - Ciniza	Naphtha - Ciniza	--	--	--	--	--	--	--	--	--
Speciation Profile Type		Partial Speciation	Partial Speciation	Partial Speciation	None	None	None	None	None	None	None	None	None
Monthly Throughput		2,475,000	2,475,000	2,475,000	--	--	--	--	--	--	--	--	--
Days-In-Service	Input "0" for OOS	31	30	31	--	--	--	--	--	--	--	--	--
Shell Clingage Factor		0.0015	0.0015	0.0015	--	--	--	--	--	--	--	--	--
Total Deck Fitting Loss Factor	Eqn. 2-6	129.9	136.8	139.5	--	--	--	--	--	--	--	--	--
Daily Total Solar Insolation Factor		1,500	1,100	920	--	--	--	--	--	--	--	--	--
Product Factor	Eqn. 2-3	1.0	1.0	1.0	--	--	--	--	--	--	--	--	--
Deck Seam Loss per Unit Seam Length Factor	Converted K_D into monthly emissions by scaling by the time in service for the month.	0.000	0.000	0.000	--	--	--	--	--	--	--	--	--
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M of each component.	75.0	75.0	75.0	--	--	--	--	--	--	--	--	--
Liquid Molecular Weight		108.0	108.0	108.0	--	--	--	--	--	--	--	--	--
Liquid Density at 60 °F		6.30	6.30	6.30	--	--	--	--	--	--	--	--	--
Average Daily Minimum Ambient Temperature		36.10	19.60	12.90	--	--	--	--	--	--	--	--	--
Average Daily Maximum Ambient Temperature		70.00	54.50	44.10	--	--	--	--	--	--	--	--	--
Daily Average Ambient Temperature		53.05	37.05	28.50	--	--	--	--	--	--	--	--	--
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	59.03	41.67	32.51	--	--	--	--	--	--	--	--	--
Liquid Bulk Temperature	If T_B is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated.	54.63	38.63	30.08	--	--	--	--	--	--	--	--	--
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	5.7505	4.0960	3.3916	--	--	--	--	--	--	--	--	--
Vapor Pressure at Daily Av. Liquid Bulk Temp.	Used for vapor space expansion factor. $P_{VA,Tb}$ uses T_B.	5.2881	3.8502	3.2222	--	--	--	--	--	--	--	--	--
Vapor Pressure Function	Use T_B for calculating P_{VA} per Eqn. 2-3 Note 3.	0.1759	0.1121	0.0890	--	--	--	--	--	--	--	--	--
Average Ambient Wind Speed	Monthly Average	10.9	11.9	12.3	--	--	--	--	--	--	--	--	--
Rim Seal Loss		472.46	314.75	265.95	--	--	--	--	--	--	--	--	--
Withdrawal Loss	Constant 0.943 has units of (1,000 ft^3 gal / bbl^2)	6.18	6.18	6.18	--	--	--	--	--	--	--	--	--
Deck Fitting Loss		145.62	94.50	79.09	--	--	--	--	--	--	--	--	--
Deck Seam Loss		0.00	0.00	0.00	--	--	--	--	--	--	--	--	--
Total Emission from Normal Operation		**624.25**	**415.43**	**351.22**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

	Calculatio	10	11	12
Parameter Title	**Notes**	**Oct**	**Nov**	**Dec**
Service		**Service Change**	**Service Change**	**Service Change**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil	--	--	--
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):	No Service Change	No Service Change	No Service Change
Speciation Profile	Select from list (add new in 'Speciation Input' tab):	--	--	--
Speciation Profile Type		None	None	None
Monthly Throughput		--	--	--
Days-In-Service	Input "0" for OOS	--	--	--
Shell Clingage Factor		--	--	--
Total Deck Fitting Loss Factor	Eqn. 2-6	--	--	--
Daily Total Solar Insolation Factor		--	--	--
Product Factor	Eqn. 2-3	--	--	--
Deck Seam Loss per Unit Seam Length Factor	Converted K_D into monthly emissions by scaling by the time in service for the month.	--	--	--
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M of each component.	--	--	--
Liquid Molecular Weight		--	--	--
Liquid Density at 60 °F		--	--	--
Average Daily Minimum Ambient Temperature		--	--	--
Average Daily Maximum Ambient Temperature		--	--	--
Daily Average Ambient Temperature		--	--	--
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	--	--	--
Liquid Bulk Temperature	If T_B is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated.	--	--	--
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	--	--	--
Vapor Pressure at Daily Av. Liquid Bulk Temp.	Used for vapor space expansion factor. $P_{VA,Tb}$ uses T_B.	--	--	--
Vapor Pressure Function	Use T_B for calculating P_{VA} per Eqn. 2-3 Note 3.	--	--	--
Average Ambient Wind Speed	Monthly Average	--	--	--
Rim Seal Loss		--	--	--
Withdrawal Loss	Constant 0.943 has units of (1,000 ft^3 gal / bbl^2)	--	--	--
Deck Fitting Loss		--	--	--
Deck Seam Loss		--	--	--
Total Emission from Normal Operation		**0.00**	**0.00**	**0.00**

Speciated Component Emissions	Species ID	Vapor MW M_{Vi}	Annual Emissions	Monthly Emissions (lb/month) $L_{Ti} = Z_{Vi} * (L_R + L_F + L_D) + Z_{Li} * L_{WD}$								
Component Name		(lb/lb-mol)	lb/yr	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Hexane (-n)	1	86.17	75.72	3.08	3.45	5.02	6.29	6.92	10.71	10.43	9.67	8.31
Benzene	2	78.11	13.45	0.53	0.60	0.88	1.10	1.22	1.93	1.89	1.75	1.49
2,2,4-Trimethylpentane (isooctane)	3	114.23	1.14	0.05	0.05	0.07	0.09	0.10	0.16	0.16	0.15	0.13
Toluene	4	92.13	28.21	1.11	1.26	1.80	2.25	2.53	4.07	4.01	3.73	3.13
Ethylbenzene	5	106.17	2.50	0.11	0.12	0.16	0.20	0.22	0.35	0.34	0.32	0.27
Xylenes (mixed isomers)	6	106.17	13.75	0.63	0.69	0.90	1.08	1.21	1.88	1.86	1.75	1.47
Isopropyl benzene (Cumene)	7	120.2	0.35	0.02	0.02	0.02	0.03	0.03	0.04	0.04	0.04	0.04
Methyl-tert-butyl ether (MTBE)	8	88.15	0.00									
1,2,4-Trimethylbenzene	9	120.19	0.00									
Cyclohexane	10	84.16	0.00									
Gasoline (RVP 13)	11	62	0.00									
Ethyl alcohol	12	46.07	0.00									
Acetaldehyde	13	44	0.00									
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Speciated Component Emissions				Service Change - Monthly Emissions (lb/month)								
Component Name	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**
Hexane (-n)	5.78	3.40	2.68									
Benzene	1.02	0.59	0.46									
2,2,4-Trimethylpentane (isooctane)	0.09	0.05	0.04									
Toluene	2.12	1.23	0.97									
Ethylbenzene	0.19	0.12	0.10									
Xylenes (mixed isomers)	1.04	0.67	0.57									
Isopropyl benzene (Cumene)	0.03	0.02	0.02									
Methyl-tert-butyl ether (MTBE)												
1,2,4-Trimethylbenzene												
Cyclohexane												
Gasoline (RVP 13)												
Ethyl alcohol												
Acetaldehyde												
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Speciated Component Emissions

Component Name	Oct	Nov	Dec
Hexane (-n)			
Benzene			
2,2,4-Trimethylpentane (isooctane)			
Toluene			
Ethylbenzene			
Xylenes (mixed isomers)			
Isopropyl benzene (Cumene)			
Methyl-tert-butyl ether (MTBE)			
1,2,4-Trimethylbenzene			
Cyclohexane			
Gasoline (RVP 13)			
Ethyl alcohol			
Acetaldehyde			
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TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T-575
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Vertical Fixed Roof Tank
Description:	Kerosene

Tank Dimensions

Shell Height (ft):	40.00
Diameter (ft):	42.50
Liquid Height (ft) :	37.00
Avg. Liquid Height (ft):	30.00
Volume (gallons):	336,000.00
Turnovers:	11.01
Net Throughput(gal/yr):	3,699,998.40
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Light
Shell Condition	Good
Roof Color/Shade:	Gray/Light
Roof Condition:	Good

Roof Characteristics

Type:	Cone
Height (ft)	1.50
Slope (ft/ft) (Cone Roof)	0.07

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-575 - Vertical Fixed Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Kerosene - Ciniza	All	57.39	44.50	70.27	50.84	0.0078	0.0050	0.0111	130.0000			175.00	Option 1: VP50 = .006 VP60 = .0085
1,2,4-Trimethylbenzene						0.0184	0.0107	0.0305	120.1900	0.0087	0.0274	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane						0.5522	0.3747	0.7954	114.2300	0.0009	0.0853	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Cyclohexane						1.1282	0.7837	1.5897	84.1600	0.0002	0.0387	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0990	0.0620	0.1539	106.1700	0.0004	0.0068	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.7870	1.2595	2.4843	86.1700	0.0001	0.0307	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopropyl benzene						0.0463	0.0279	0.0744	120.2000	0.0003	0.0024	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Naphthalene						0.0022	0.0012	0.0037	128.0000	0.0064	0.0024	128.00	Option 1: VP50 = .0015 VP60 = .0024
Phenol						0.0065	0.0045	0.0101	94.0000	0.0077	0.0086	94.00	Option 1: VP50 = .005 VP60 = .007
Toluene						0.3042	0.2000	0.4512	92.1300	0.0006	0.0313	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.0051	0.0035	0.0036	147.2603	0.9703	0.7043	178.22	
Xylene (-m)						0.0824	0.0513	0.1286	106.1700	0.0044	0.0622	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T-575 - Vertical Fixed Roof Tank
Gallup, NM

Annual Emission Calcaulations

Standing Losses (lb):	94.4626
Vapor Space Volume (cu ft):	14,895.5670
Vapor Density (lb/cu ft):	0.0002
Vapor Space Expansion Factor:	0.0949
Vented Vapor Saturation Factor:	0.9957
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	14,895.5670
Tank Diameter (ft):	42.5000
Vapor Space Outage (ft):	10.5000
Tank Shell Height (ft):	40.0000
Average Liquid Height (ft):	30.0000
Roof Outage (ft):	0.5000
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.5000
Roof Height (ft):	1.5000
Roof Slope (ft/ft):	0.0700
Shell Radius (ft):	21.2500
Vapor Density	
Vapor Density (lb/cu ft):	0.0002
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0078
Daily Avg. Liquid Surface Temp. (deg. R):	517.0582
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	510.5100
Tank Paint Solar Absorptance (Shell):	0.5400
Tank Paint Solar Absorptance (Roof):	0.5400
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0949
Daily Vapor Temperature Range (deg. R):	51.5419
Daily Vapor Pressure Range (psia):	0.0062
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0078
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0050
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0111
Daily Avg. Liquid Surface Temp. (deg R):	517.0582
Daily Min. Liquid Surface Temp. (deg R):	504.1727
Daily Max. Liquid Surface Temp. (deg R):	529.9436
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9957
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0078
Vapor Space Outage (ft):	10.5000
Working Losses (lb):	89.8672
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0078
Annual Net Throughput (gal/yr.):	3,699,998.4000
Annual Turnovers:	11.0119
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	336,000.0000
Maximum Liquid Height (ft):	37.0000
Tank Diameter (ft):	42.5000
Working Loss Product Factor:	1.0000
Total Losses (lb):	184.3299

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-575 - Vertical Fixed Roof Tank
Gallup, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Kerosene - Ciniza	89.87	94.46	184.33
Hexane (-n)	2.75	2.90	5.65
Cyclohexane	3.48	3.66	7.14
2,2,4-Trimethylpentane	7.66	8.05	15.72
Toluene	2.81	2.96	5.77
Ethylbenzene	0.61	0.64	1.25
Xylene (-m)	5.59	5.88	11.46
Isopropyl benzene	0.21	0.23	0.44
1,2,4-Trimethylbenzene	2.47	2.59	5.06
Naphthalene	0.21	0.22	0.44
Phenol	0.77	0.81	1.58
Unidentified Components	63.29	66.53	129.82

Floating Roof Tank Emissions

Based on AP-42, November 2006, Section 7.1.3.2.

Tool Last Updated: 12/14/15 Click Here to Go Back to Cover Page

Reporting Year	2018

Tank Reference Parameters				
Parameter Title	Notes	Parameter Symbol	Units	Value
Tank ID	Enter only Tank ID in this tab.			T-576
Tank Name		TK_{name}		T-576
Actual Location		Loc_{Act}		Gallup, NM
Location for Calculation Purposes		Loc_{Calc}		Gallup, NM
Tank Roof Type		TK_{roof}		EFR - Double-Deck
Normal Capacity		Cap	gal	1,680,000
Diameter		D	ft	85.0
Shell Height or Length		H_S	ft	40.0
External Shell Color		SC_{ext}		Tan
External Shell Paint Condition		PC_{Shell}		Good
Roof Color/Shade		RC		Tan
Roof Paint Condition		PC_{Roof}		Good
Tank Shell Solar Absorbance		α_{Shell}		0.43
Tank Roof Paint Solar Absorbance		α_{Roof}		0.43
Total Tank Paint Solar Absorbance	= $(\alpha_{Shell} + \alpha_{Roof}) / 2$ {Note A, Table 7.1-6}	α_{Tot}		0.43
Ideal Gas Constant,		R	psia ft^3 / lbmole °R	10.731
Ambient Pressure		P_A	psia	11.300
Rim-Seal System		$TK_{RimSeal}$		Liquid-mounted/Rim-mounted
Tank Fittings		$TK_{Fittings}$		Detail

Floating Roof Parameters				
Parameter Title	Notes	Parameter Symbol	Units	Value
Heated Tank?		HT		No
Liquid Bulk Temperature	Heated Tanks Only	T_B	Degrees F	--
Number of fixed roof support columns		N_{Col}		0
Effective Column Diameter	1.1 for 9" by 7" built-up column 0.7 for 8" diameter pipe column 1.0 for unknown pipe column	F_C	(col perimeter/π) ft	1.0
Internal Shell Condition		SC_{int}		Light Rust
Tank Construction		TK_{Const}		Welded
Deck Type		TK_{Deck}		--
Total Length of Deck Seams		L_{Seam}	ft	--
Area of deck	= π * D^2 / 4 {Eqn. 2-9}	A_{deck}	ft^2	5,674.5
Deck Seam Length Factor	= L_{Seam} / A_{deck} {Eqn. 2-9} = 0.20 ft/ft^2 {5' wide sheet} = 0.17 ft/ft^2 {6' wide sheet} = 0.14 ft/ft^2 {7' wide sheet} = 0.33 ft/ft^2 {5' x 7.5' panels} = 0.28 ft/ft^2 {5' 12' panels} = 0.20 ft/ft^2 {most common type}	S_D	ft/ft^2	--
Deck Construction (IFR w/Bolted Decks Only)	Not applicable if L_{Seam} specified.	$TK_{DeckConst}$		--
Zero wind speed rim seal loss factor	AP-42 Table 7.1-8	K_{RA}	lb-mole/ft-yr	0.3
Wind speed dependent rim seal loss factor	AP-42 Table 7.1-8	K_{RB}	lb-mole/$(mph)^n$-ft-yr	0.6
Fitting Wind Speed Correction Factor	= 0.7 {EFR Tanks Only} = 0.0 {IFR and Domed EFR Tanks Only} {Eqn. 2-7}	K_V		0.7
Seal related wind speed exponent		n		0.3
Days per Year	For leap years, days = 366	t_{yr}	days/yr	365

Emission Summary			
Annual Throughput, gal	**67,000,000**	**Annual Turnovers**	**39.88**
Annual Emissions, tons	**2.14**		
Month	**Normal Operation Loss, lbs**	**Emissions, tpy**	
Jan	303.80	0.152	
Feb	325.95	0.163	
Mar	341.81	0.171	
Apr	270.72	0.135	
May	316.35	0.158	
Jun	440.48	0.220	
Jul	459.96	0.230	
Aug	449.97	0.225	
Sep	374.17	0.187	
Oct	403.67	0.202	
Nov	324.38	0.162	
Dec	267.77	0.1339	

Note: The emission summary table is pulled into the Tank Emissions tab using cell references A31:B42. The emission summary must remain at this cell reference to function properly.

Calculations						1	2	3	4	5	6	7	8	9
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Reference or Equation**		**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**
Service						**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil					Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):			= User specified		Lt Gas Gasoline Blendstock 13.5	Lt Gas Gasoline Blendstock 13.5	Lt Gas Gasoline Blendstock 11.5	Lt Gas Gasoline Blendstock 9	Lt Gas Gasoline Blendstock 9	Lt Gas Gasoline Blendstock 9	Lt Gas Gasoline Blendstock 9	Lt Gas Gasoline Blendstock 9	Lt Gas Gasoline Blendstock 9
Speciation Profile	Select from list (add new in 'Speciation Input' tab):			= User specified		Lt Cat Gasoline Blendstock	Lt Cat Gasoline Blendstock	Lt Cat Gasoline Blendstock	Lt Cat Gasoline Blendstock	Lt Cat Gasoline Blendstock	Lt Cat Gasoline Blendstock	Lt Cat Gasoline Blendstock	Lt Cat Gasoline Blendstock	Lt Cat Gasoline Blendstock
Speciation Profile Type				= User specified		Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation
Monthly Throughput		Q	gal/month	= User specified		5,583,333	5,583,333	5,583,333	5,583,333	5,583,333	5,583,333	5,583,333	5,583,333	5,583,333
Days-In-Service	Input "0" for OOS	t_{IS}	days	= User specified		31	28	31	30	31	30	31	31	30
Shell Clingage Factor		C_S	bbl / 1000 ft^2	{Table 7.1-10}		0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015
Total Deck Fitting Loss Factor	Eqn. 2-6	F_F	lb-mole/yr	$= [(N_{F1} * K_{F1}) + (N_{F2} * K_{F2}) + \ldots + (N_{Fnf} * K_{Fnf})]$ {Eqn. 2-6}		245.6	245.6	250.8	261.7	250.8	249.7	239.2	233.3	243.9
Daily Total Solar Insolation Factor		I	Btu / ft^2 day			1,020	1,320	1,710	2,170	2,440	2,570	2,390	2,190	1,860
Product Factor	Eqn. 2-3	K_C		= 0.4 {crude oils} = 1.0 {all other org. liquids}		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Deck Seam Loss per Unit Seam Length Factor	Converted K_D into monthly emissions by scaling by the time in service for the month.	K_D	lb-mole / ft-month	= 0.0 {IFR Tank with welded deck and all EFR Tanks} $= 0.14 * t_{IS} / t_{yr}$ {bolted deck}		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M of each component.	M_V	lb/lb-mole	= VOL data of tank contents {partial speciation} $M_V = \Sigma (M_{Vi} * (P_{VA,Tla,i}/P_{VA,Tla}))$		67.0	67.0	67.0	67.0	67.0	67.0	67.0	67.0	67.0
Liquid Molecular Weight		M_L	lb/lb-mole	$M_L = 1 / \Sigma (Z_{Li} / M_{Li})$ {full speciation, Eqn. 1-22}		98.0	98.0	98.0	98.0	98.0	98.0	98.0	98.0	98.0
Liquid Density at 60 °F		W_L	lb/gal	= VOL data of tank contents {partial speciation} $= \Sigma (M_{L,i} * Z_{Li})$ {full speciation, Eqn. 1-22}		6.20	6.20	6.20	6.20	6.20	6.20	6.20	6.20	6.20
Average Daily Minimum Ambient Temperature		T_{AN}	°F			20.50	21.70	26.10	29.30	37.20	47.80	54.10	52.50	45.30
Average Daily Maximum Ambient Temperature		T_{AX}	°F			46.90	56.70	63.00	65.30	68.90	86.00	84.70	87.80	82.60
Daily Average Ambient Temperature		T_{AA}	°F	$= (T_{AX} + T_{AN}) / 2$ {Eqn. 1-27}		33.70	39.20	44.55	47.30	53.05	66.90	69.40	70.15	63.95
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	T_{LA}	°F	$= (0.44 * T_{AA}) + (0.56 * T_B) + (0.0079 * \alpha_{Tot} * I)$ {Eqn. 1-26}		38.05	44.57	51.24	55.56	62.22	76.52	78.40	78.47	71.15
Liquid Bulk Temperature	If T_B is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated.	T_B	degrees F	= specified by user {heated tanks only} $= T_{AA} + 6 * \alpha_{Tot} - 1$ {Eqn. 1-28}		35.28	40.78	46.13	48.88	54.63	68.48	70.98	71.73	65.53
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	$P_{VA,Tla}$	psia	*{full speciation profiles, Eqn. 1-22}:* Sum of partial true vapor pressures components. *{partial/no speciation profiles}:* Vapor pressures at T (°F) based on P_{VA} values in VOLs		4.7351	5.3941	5.1168	4.2217	4.8165	6.3188	6.5425	6.5510	5.7167
Vapor Pressure at Daily Av. Liquid Bulk Temp.	Used for vapor space expansion factor. $P_{VA,Tb}$ uses T_B.	$P_{VA,Tb}$	psia	tab at ΔT (°F) increments by interpolating between the P_{VA} values at the next highest/lowest T. $P_{VA,T} = (T - T_{Low}) / (T_{High} - T_{Low}) * (P_{VA,T,High} - P_{VA,T,Low}) + P_{VA,T,Low}$		4.4754	5.0027	4.6224	3.6869	4.1440	5.4341	5.6980	5.7791	5.1354
Vapor Pressure Function	Use T_B for calculating P_{VA} per Eqn. 2-3 Note 3.	P_f		$= (P_{VA,Tb} / P_A) / (1 + (1 - P_{VA,Tb} / P_A)^{0.5})^2$ {Eqn. 2-3}		0.1349	0.1608	0.1496	0.1164	0.1380	0.2020	0.2130	0.2134	0.1745
Average Ambient Wind Speed	Monthly Average	v	mph	= 0 {Domed EFR and all IFR tanks, Eqn. 2-3 Note 3}		11.7	11.7	12.6	14.5	12.6	12.4	10.6	9.6	11.4
Rim Seal Loss		L_R	lb/month	$= (K_{Ra} + K_{Rb} * v^n) * D * P_f * M_V * K_C * t_{IS} / t_{yr}$ {Eqn. 2-2}		101.48	109.23	114.56	89.27	105.67	149.08	156.39	153.02	126.17
Withdrawal Loss	Constant 0.943 has units of (1,000 ft^3 gal / bbl^2)	L_{WD}	lb/month	$= 0.943 * (Q / (42 \text{ gal/bbl})) * C_S * W_L / D * (1 + (N_{Col} * F_C / D))$ {Eqn. 2-4}		13.72	13.72	13.72	13.72	13.72	13.72	13.72	13.72	13.72
Deck Fitting Loss		L_F	lb/month	$= F_F * P_f * M_V * K_C * t_{IS} / t_{yr}$ {Eqn 2-5}		188.60	203.00	213.53	167.74	196.96	277.68	289.85	283.23	234.28
Deck Seam Loss		L_D	lb/month	= 0 {welded IFR and all EFR tanks} $= K_D * S_D * D^2 * P_f * M_V * K_C$ {Eqn. 2-9}		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Emission from Normal Operation		L_T	**lb/month**	$= L_R + L_{WD} + L_F + L_D$ **{Eqn. 2-1}**		**303.80**	**325.95**	**341.81**	**270.72**	**316.35**	**440.48**	**459.96**	**449.97**	**374.17**

	Calculatio	10	11	12	1	2	3	4	5	6	7	8	9
Parameter Title	**Notes**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**
Service		**Main Service**	**Main Service**	**Main Service**	**Service Change**	**Service Change**	**Service Change**	**Service Change**	**Service Change**	**Service Change**	**Service Change**	**Service Change**	**Service Change**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	--	--	--	--	--	--	--	--	--
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):	Lt Gas Gasoline Blendstock 11.5	Lt Gas Gasoline Blendstock 13.5	Lt Gas Gasoline Blendstock 13.5	No Service Change	No Service Change	No Service Change	No Service Change	No Service Change	No Service Change	No Service Change	No Service Change	No Service Change
Speciation Profile	Select from list (add new in 'Speciation Input' tab):	Lt Cat Gasoline Blendstock	Lt Cat Gasoline Blendstock	Lt Cat Gasoline Blendstock	--	--	--	--	--	--	--	--	--
Speciation Profile Type		Partial Speciation	Partial Speciation	Partial Speciation	None	None	None	None	None	None	None	None	None
Monthly Throughput		5,583,333	5,583,333	5,583,333	--	--	--	--	--	--	--	--	--
Days-In-Service	Input "0" for OOS	31	30	31	--	--	--	--	--	--	--	--	--
Shell Clingage Factor		0.0015	0.0015	0.0015	--	--	--	--	--	--	--	--	--
Total Deck Fitting Loss Factor	Eqn. 2-6	240.9	246.8	249.1	--	--	--	--	--	--	--	--	--
Daily Total Solar Insolation Factor		1,500	1,100	920	--	--	--	--	--	--	--	--	--
Product Factor	Eqn. 2-3	1.0	1.0	1.0	--	--	--	--	--	--	--	--	--
Deck Seam Loss per Unit Seam Length Factor	Converted K_D into monthly emissions by scaling by the time in service for the month.	0.000	0.000	0.000	--	--	--	--	--	--	--	--	--
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M of each component.	67.0	67.0	67.0	--	--	--	--	--	--	--	--	--
Liquid Molecular Weight		98.0	98.0	98.0	--	--	--	--	--	--	--	--	--
Liquid Density at 60 °F		6.20	6.20	6.20	--	--	--	--	--	--	--	--	--
Average Daily Minimum Ambient Temperature		36.10	19.60	12.90	--	--	--	--	--	--	--	--	--
Average Daily Maximum Ambient Temperature		70.00	54.50	44.10	--	--	--	--	--	--	--	--	--
Daily Average Ambient Temperature		53.05	37.05	28.50	--	--	--	--	--	--	--	--	--
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	59.03	41.67	32.51	--	--	--	--	--	--	--	--	--
Liquid Bulk Temperature	If T_B is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated.	54.63	38.63	30.08	--	--	--	--	--	--	--	--	--
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	5.9500	5.0927	4.2273	--	--	--	--	--	--	--	--	--
Vapor Pressure at Daily Av. Liquid Bulk Temp.	Used for vapor space expansion factor. $P_{VA,Tb}$ uses T_B.	5.4668	4.7910	4.0188	--	--	--	--	--	--	--	--	--
Vapor Pressure Function	Use T_B for calculating P_{VA} per Eqn. 2-3 Note 3.	0.1848	0.1487	0.1166	--	--	--	--	--	--	--	--	--
Average Ambient Wind Speed	Monthly Average	10.9	11.9	12.3	--	--	--	--	--	--	--	--	--
Rim Seal Loss		136.61	108.64	88.77	--	--	--	--	--	--	--	--	--
Withdrawal Loss	Constant 0.943 has units of (1,000 ft^3 gal / bbl^2)	13.72	13.72	13.72	--	--	--	--	--	--	--	--	--
Deck Fitting Loss		253.35	202.02	165.28	--	--	--	--	--	--	--	--	--
Deck Seam Loss		0.00	0.00	0.00	--	--	--	--	--	--	--	--	--
Total Emission from Normal Operation		**403.67**	**324.38**	**267.77**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Parameter Title	Notes	10 Oct	11 Nov	12 Dec
Service		Service Change	Service Change	Service Change
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil	--	--	--
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):	No Service Change	No Service Change	No Service Change
Speciation Profile	Select from list (add new in 'Speciation Input' tab):	--	--	--
Speciation Profile Type		None	None	None
Monthly Throughput		--	--	--
Days-In-Service	Input "0" for OOS	--	--	--
Shell Clingage Factor		--	--	--
Total Deck Fitting Loss Factor	Eqn. 2-6	--	--	--
Daily Total Solar Insolation Factor		--	--	--
Product Factor	Eqn. 2-3	--	--	--
Deck Seam Loss per Unit Seam Length Factor	Converted K_D into monthly emissions by scaling by the time in service for the month.	--	--	--
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M of each component.	--	--	--
Liquid Molecular Weight		--	--	--
Liquid Density at 60 °F		--	--	--
Average Daily Minimum Ambient Temperature		--	--	--
Average Daily Maximum Ambient Temperature		--	--	--
Daily Average Ambient Temperature		--	--	--
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	--	--	--
Liquid Bulk Temperature	If T_B is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated.	--	--	--
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	--	--	--
Vapor Pressure at Daily Av. Liquid Bulk Temp.	Used for vapor space expansion factor. $P_{VA,Tb}$ uses T_B.	--	--	--
Vapor Pressure Function	Use T_B for calculating P_{VA} per Eqn. 2-3 Note 3.	--	--	--
Average Ambient Wind Speed	Monthly Average	--	--	--
Rim Seal Loss		--	--	--
Withdrawal Loss	Constant 0.943 has units of (1,000 ft^3 gal / bbl^2)	--	--	--
Deck Fitting Loss		--	--	--
Deck Seam Loss		--	--	--
Total Emission from Normal Operation		**0.00**	**0.00**	**0.00**

Speciated Component Emissions	Species ID	Vapor MW M_{Vi}	Annual Emissions	Monthly Emissions (lb/month) $L_{Ti} = Z_{Vi} * (L_R + L_F + L_D) + Z_{Li} * L_{WD}$								
Component Name		(lb/lb-mol)	lb/yr	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Hexane (-n)	1	86.17	59.96	2.78	3.11	4.02	4.27	5.16	7.73	8.15	7.98	6.40
Benzene	2	78.11	26.39	1.22	1.37	1.76	1.87	2.26	3.42	3.61	3.53	2.82
2,2,4-Trimethylpentane (isooctane)	3	114.23	4.98	0.24	0.27	0.34	0.36	0.43	0.63	0.66	0.65	0.52
Toluene	4	92.13	23.38	1.21	1.32	1.59	1.68	1.98	2.88	3.04	2.98	2.42
Ethylbenzene	5	106.17	2.66	0.16	0.17	0.19	0.20	0.22	0.29	0.31	0.30	0.26
Xylenes (mixed isomers)	6	106.17	11.43	0.73	0.76	0.84	0.87	0.96	1.24	1.29	1.27	1.09
Isopropyl benzene (Cumene)	7	120.2	0.09	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Methyl-tert-butyl ether (MTBE)	8	88.15	0.00									
1,2,4-Trimethylbenzene	9	120.19	0.00									
Cyclohexane	10	84.16	0.00									
Gasoline (RVP 13)	11	62	0.00									
Ethyl alcohol	12	46.07	0.00									
Acetaldehyde	13	44	0.00									
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Speciated Component Emissions				Service Change - Monthly Emissions (lb/month)								
Component Name	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**
Hexane (-n)	4.97	3.03	2.38									
Benzene	2.17	1.33	1.05									
2,2,4-Trimethylpentane (isooctane)	0.41	0.26	0.21									
Toluene	1.91	1.28	1.09									
Ethylbenzene	0.22	0.17	0.16									
Xylenes (mixed isomers)	0.93	0.75	0.70									
Isopropyl benzene (Cumene)	0.01	0.01	0.01									
Methyl-tert-butyl ether (MTBE)												
1,2,4-Trimethylbenzene												
Cyclohexane												
Gasoline (RVP 13)												
Ethyl alcohol												
Acetaldehyde												
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Speciated Component Emissions			
Component Name	**Oct**	**Nov**	**Dec**
Hexane (-n)			
Benzene			
2,2,4-Trimethylpentane (isooctane)			
Toluene			
Ethylbenzene			
Xylenes (mixed isomers)			
Isopropyl benzene (Cumene)			
Methyl-tert-butyl ether (MTBE)			
1,2,4-Trimethylbenzene			
Cyclohexane			
Gasoline (RVP 13)			
Ethyl alcohol			
Acetaldehyde			
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TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification	
User Identification:	T-577
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Vertical Fixed Roof Tank
Description:	Diesel
Tank Dimensions	
Shell Height (ft):	40.00
Diameter (ft):	42.50
Liquid Height (ft) :	40.00
Avg. Liquid Height (ft):	25.00
Volume (gallons):	420,000.00
Turnovers:	102.38
Net Throughput(gal/yr):	43,000,000.00
Is Tank Heated (y/n):	N
Paint Characteristics	
Shell Color/Shade:	Gray/Light
Shell Condition	Good
Roof Color/Shade:	Gray/Light
Roof Condition:	Good
Roof Characteristics	
Type:	Cone
Height (ft)	1.50
Slope (ft/ft) (Cone Roof)	0.07
Breather Vent Settings	
Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-577 - Vertical Fixed Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Diesel #2 - Ciniza	All	57.39	44.50	70.27	50.84	0.0066	0.0037	0.0091	130.0000			217.00	Option 1: VP50 = .0045 VP60 = .0074
1,2,4-Trimethylbenzene						0.0184	0.0107	0.0305	120.1900	0.0039	0.0180	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane						0.5522	0.3747	0.7954	114.2300	0.0001	0.0139	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Cyclohexane						1.1282	0.7837	1.5897	84.1600	0.0004	0.1134	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0990	0.0620	0.1539	106.1700	0.0002	0.0050	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Isopropyl benzene						0.0463	0.0279	0.0744	120.2000	0.0001	0.0012	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Naphthalene						0.0022	0.0012	0.0037	128.0000	0.0018	0.0010	128.00	Option 1: VP50 = .0015 VP60 = .0024
Toluene						0.3042	0.2000	0.4512	92.1300	0.0006	0.0459	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.0045	0.0034	0.0034	148.6199	0.9908	0.7582	218.86	
Xylene (-m)						0.0824	0.0513	0.1286	106.1700	0.0021	0.0435	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T-577 - Vertical Fixed Roof Tank
Gallup, NM

Annual Emission Calcaulations

Standing Losses (lb):	117.8253
Vapor Space Volume (cu ft):	21,988.6942
Vapor Density (lb/cu ft):	0.0002
Vapor Space Expansion Factor:	0.0948
Vented Vapor Saturation Factor:	0.9946
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	21,988.6942
Tank Diameter (ft):	42.5000
Vapor Space Outage (ft):	15.5000
Tank Shell Height (ft):	40.0000
Average Liquid Height (ft):	25.0000
Roof Outage (ft):	0.5000
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.5000
Roof Height (ft):	1.5000
Roof Slope (ft/ft):	0.0698
Shell Radius (ft):	21.2500
Vapor Density	
Vapor Density (lb/cu ft):	0.0002
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0066
Daily Avg. Liquid Surface Temp. (deg. R):	517.0582
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	510.5100
Tank Paint Solar Absorptance (Shell):	0.5400
Tank Paint Solar Absorptance (Roof):	0.5400
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0948
Daily Vapor Temperature Range (deg. R):	51.5419
Daily Vapor Pressure Range (psia):	0.0054
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0066
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0037
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0091
Daily Avg. Liquid Surface Temp. (deg R):	517.0582
Daily Min. Liquid Surface Temp. (deg R):	504.1727
Daily Max. Liquid Surface Temp. (deg R):	529.9436
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9946
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0066
Vapor Space Outage (ft):	15.5000
Working Losses (lb):	406.4090
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0066
Annual Net Throughput (gal/yr.):	43,000,000.0000
Annual Turnovers:	102.3810
Turnover Factor:	0.4597
Maximum Liquid Volume (gal):	420,000.0000
Maximum Liquid Height (ft):	40.0000
Tank Diameter (ft):	42.5000
Working Loss Product Factor:	1.0000
Total Losses (lb):	524.2343

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-577 - Vertical Fixed Roof Tank
Gallup, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Diesel #2 - Ciniza	406.41	117.83	524.23
Cyclohexane	46.09	13.36	59.45
2,2,4-Trimethylpentane	5.64	1.64	7.28
Toluene	18.64	5.40	24.04
Ethylbenzene	2.02	0.59	2.61
Xylene (-m)	17.67	5.12	22.80
Isopropyl benzene	0.47	0.14	0.61
1,2,4-Trimethylbenzene	7.32	2.12	9.45
Naphthalene	0.40	0.12	0.51
Unidentified Components	308.15	89.34	397.49

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T-579
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Vertical Fixed Roof Tank
Description:	Diesel

Tank Dimensions

Shell Height (ft):		40.00
Diameter (ft):		60.00
Liquid Height (ft) :		40.00
Avg. Liquid Height (ft):		30.00
Volume (gallons):		840,000.00
Turnovers:		51.19
Net Throughput(gal/yr):		43,000,000.00
Is Tank Heated (y/n):	N	

Paint Characteristics

Shell Color/Shade:	Gray/Light
Shell Condition	Good
Roof Color/Shade:	Gray/Light
Roof Condition:	Good

Roof Characteristics

Type:	Cone	
Height (ft)		2.00
Slope (ft/ft) (Cone Roof)		0.07

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-579 - Vertical Fixed Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Diesel #2 - Ciniza	All	57.39	44.50	70.27	50.84	0.0066	0.0037	0.0091	130.0000			217.00	Option 1: VP50 = .0045 VP60 = .0074
1,2,4-Trimethylbenzene						0.0184	0.0107	0.0305	120.1900	0.0039	0.0180	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane						0.5522	0.3747	0.7954	114.2300	0.0001	0.0139	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Cyclohexane						1.1282	0.7837	1.5897	84.1600	0.0004	0.1134	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0990	0.0620	0.1539	106.1700	0.0002	0.0050	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Isopropyl benzene						0.0463	0.0279	0.0744	120.2000	0.0001	0.0012	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Naphthalene						0.0022	0.0012	0.0037	128.0000	0.0018	0.0010	128.00	Option 1: VP50 = .0015 VP60 = .0024
Toluene						0.3042	0.2000	0.4512	92.1300	0.0006	0.0459	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.0045	0.0034	0.0034	148.6199	0.9908	0.7582	218.86	
Xylene (-m)						0.0824	0.0513	0.1286	106.1700	0.0021	0.0435	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T-579 - Vertical Fixed Roof Tank
Gallup, NM

Annual Emission Calcaulations

Standing Losses (lb):	161.8810
Vapor Space Volume (cu ft):	30,159.2894
Vapor Density (lb/cu ft):	0.0002
Vapor Space Expansion Factor:	0.0948
Vented Vapor Saturation Factor:	0.9963
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	30,159.2894
Tank Diameter (ft):	60.0000
Vapor Space Outage (ft):	10.6667
Tank Shell Height (ft):	40.0000
Average Liquid Height (ft):	30.0000
Roof Outage (ft):	0.6667
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.6667
Roof Height (ft):	2.0000
Roof Slope (ft/ft):	0.0667
Shell Radius (ft):	30.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0002
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0066
Daily Avg. Liquid Surface Temp. (deg. R):	517.0582
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	510.5100
Tank Paint Solar Absorptance (Shell):	0.5400
Tank Paint Solar Absorptance (Roof):	0.5400
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0948
Daily Vapor Temperature Range (deg. R):	51.5419
Daily Vapor Pressure Range (psia):	0.0054
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0066
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0037
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0091
Daily Avg. Liquid Surface Temp. (deg R):	517.0582
Daily Min. Liquid Surface Temp. (deg R):	504.1727
Daily Max. Liquid Surface Temp. (deg R):	529.9436
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9963
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0066
Vapor Space Outage (ft):	10.6667
Working Losses (lb):	665.4690
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0066
Annual Net Throughput (gal/yr.):	43,000,000.0000
Annual Turnovers:	51.1905
Turnover Factor:	0.7527
Maximum Liquid Volume (gal):	840,000.0000
Maximum Liquid Height (ft):	40.0000
Tank Diameter (ft):	60.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	827.3500

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-579 - Vertical Fixed Roof Tank
Gallup, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Diesel #2 - Ciniza	665.47	161.88	827.35
Cyclohexane	75.47	18.36	93.82
2,2,4-Trimethylpentane	9.24	2.25	11.48
Toluene	30.52	7.42	37.95
Ethylbenzene	3.31	0.81	4.12
Xylene (-m)	28.94	7.04	35.98
Isopropyl benzene	0.77	0.19	0.96
1,2,4-Trimethylbenzene	11.99	2.92	14.91
Naphthalene	0.65	0.16	0.81
Unidentified Components	504.58	122.74	627.32

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T-581
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Internal Floating Roof Tank
Description:	Lt. Cycle Oil

Tank Dimensions

Diameter (ft):		67.00
Volume (gallons):		1,050,000.00
Turnovers:		2.19
Self Supp. Roof? (y/n):	N	
No. of Columns:		1.00
Eff. Col. Diam. (ft):		1.00

Paint Characteristics

Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	Gray/Light
Roof Condition:	Good

Rim-Seal System

Primary Seal:	Vapor-mounted
Secondary Seal	None

Deck Characteristics

Deck Fitting Category:	Detail
Deck Type:	Welded

Deck Fitting/Status	Quantity
Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed	1
Automatic Gauge Float Well/Bolted Cover, Gasketed	1
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Ladder Well (36-in. Diam.)/Sliding Cover, Gasketed	1
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Gasketed	20
Sample Pipe or Well (24-in. Diam.)/Slotted Pipe-Sliding Cover, Gask.	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-581 - Internal Floating Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
LCO - Ciniza	All	54.19	43.59	64.78	49.73	0.0057	N/A	N/A	130.0000			225.00	Option 1: VP50 = .0045 VP60 = .0074
1,2,4-Trimethylbenzene						0.0161	N/A	N/A	120.1900	0.0030	0.0147	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Ethylbenzene						0.0884	N/A	N/A	106.1700	0.0003	0.0080	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Naphthalene						0.0019	N/A	N/A	128.0000	0.0027	0.0015	128.00	Option 1: VP50 = .0015 VP60 = .0024
Toluene						0.2748	N/A	N/A	92.1300	0.0006	0.0499	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.0048	N/A	N/A	136.0056	0.9905	0.8613	227.09	
Xylene (-m)						0.0735	N/A	N/A	106.1700	0.0029	0.0645	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T-581 - Internal Floating Roof Tank
Gallup, NM

Annual Emission Calcaulations	
Rim Seal Losses (lb):	7.3789
Seal Factor A (lb-mole/ft-yr):	6.7000
Seal Factor B (lb-mole/ft-yr (mph)^n):	0.2000
Value of Vapor Pressure Function:	0.0001
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0057
Tank Diameter (ft):	67.0000
Vapor Molecular Weight (lb/lb-mole):	130.0000
Product Factor:	1.0000
Withdrawal Losses (lb):	8.5657
Number of Columns:	1.0000
Effective Column Diameter (ft):	1.0000
Annual Net Throughput (gal/yr.):	2,300,000.0000
Shell Clingage Factor (bbl/1000 sqft):	0.0015
Average Organic Liquid Density (lb/gal):	7.3000
Tank Diameter (ft):	67.0000
Deck Fitting Losses (lb):	2.8138
Value of Vapor Pressure Function:	0.0001
Vapor Molecular Weight (lb/lb-mole):	130.0000
Product Factor:	1.0000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	171.1800
Deck Seam Losses (lb):	0.0000
Deck Seam Length (ft):	0.0000
Deck Seam Loss per Unit Length Factor (lb-mole/ft-yr):	0.0000
Deck Seam Length Factor(ft/sqft):	0.0000
Tank Diameter (ft):	67.0000
Vapor Molecular Weight (lb/lb-mole):	130.0000
Product Factor:	1.0000
Total Losses (lb):	18.7584

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors KFa(lb-mole/yr)	KFb(lb-mole/(yr mph^n))	m	Losses(lb)
Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed	1	36.00	5.90	1.20	0.5918
Automatic Gauge Float Well/Bolted Cover, Gasketed	1	2.80	0.00	0.00	0.0460
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Gask.	1	0.47	0.02	0.97	0.0077
Ladder Well (36-in. Diam.)/Sliding Cover, Gasketed	1	56.00	0.00	0.00	0.9205
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Gasketed	20	1.30	0.08	0.65	0.4274
Sample Pipe or Well (24-in. Diam.)/Slotted Pipe-Sliding Cover, Gask.	1	43.00	0.00	0.00	0.7068
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	0.1019
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1	0.71	0.10	1.00	0.0117

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-581 - Internal Floating Roof Tank
Gallup, NM

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
LCO - Ciniza	7.38	8.57	2.81	0.00	18.76
Toluene	0.37	0.01	0.14	0.00	0.51
Ethylbenzene	0.06	0.00	0.02	0.00	0.08
Xylene (-m)	0.48	0.02	0.18	0.00	0.68
1,2,4-Trimethylbenzene	0.11	0.03	0.04	0.00	0.18
Naphthalene	0.01	0.02	0.00	0.00	0.04
Unidentified Components	6.36	8.48	2.42	0.00	17.26

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T-582
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Internal Floating Roof Tank
Description:	High-octane base gasoline

Tank Dimensions

Diameter (ft):	67.00
Volume (gallons):	1,050,000.00
Turnovers:	19.05
Self Supp. Roof? (y/n):	N
No. of Columns:	1.00
Eff. Col. Diam. (ft):	1.00

Paint Characteristics

Internal Shell Condition:	Light Rust
Shell Color/Shade:	Gray/Light
Shell Condition	Good
Roof Color/Shade:	Gray/Light
Roof Condition:	Good

Rim-Seal System

Primary Seal:	Mechanical Shoe
Secondary Seal	Shoe-mounted

Deck Characteristics

Deck Fitting Category:	Detail
Deck Type:	Welded

Deck Fitting/Status	Quantity
Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed	1
Automatic Gauge Float Well/Bolted Cover, Gasketed	1
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Ladder Well (36-in. Diam.)/Sliding Cover, Gasketed	1
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Gasketed	20
Sample Pipe or Well (24-in. Diam.)/Slotted Pipe-Sliding Cover, Gask.	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-582 - Internal Floating Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Gasoline (89 Oct. Base) - Ciniza	All	57.39	44.50	70.27	50.84	4.5162	N/A	N/A	67.0000			97.00	Option 4: RVP=9.4, ASTM Slope=2.5
1,2,4-Trimethylbenzene						0.0184	N/A	N/A	120.1900	0.0148	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
1-Pentene						8.2062	N/A	N/A	70.1400	0.0006	0.0016	70.14	Option 2: A=6.8442, B=1044.01, C=233.5
2,2,4-Trimethylpentane						0.5522	N/A	N/A	114.2300	0.0709	0.0126	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
2-Methyl-1-butene						4.2310	N/A	N/A	70.1300	0.0013	0.0018	70.13	Option 2: A=6.4863, B=1039.69, C=236.65
2-Pentene						6.1082	N/A	N/A	70.1400	0.0023	0.0045	70.14	Option 1: VP50 = 5 VP60 = 6.5
Benzene						1.0858	N/A	N/A	78.1100	0.0158	0.0055	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.1282	N/A	N/A	84.1600	0.0045	0.0016	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0990	N/A	N/A	106.1700	0.0052	0.0002	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.7870	N/A	N/A	86.1700	0.0109	0.0062	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopentane						9.4523	N/A	N/A	72.1500	0.1178	0.3570	72.15	Option 1: VP50 = 7.889 VP60 = 10.005
Isopropyl benzene						0.0463	N/A	N/A	120.2000	0.0003	0.0000	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Naphthalene						0.0022	N/A	N/A	128.0000	0.0015	0.0000	128.00	Option 1: VP50 = .0015 VP60 = .0024
Pentane (-n)						6.4487	N/A	N/A	72.1500	0.0176	0.0364	72.15	Option 3: A=27691, B=7.558
Phenol						0.0065	N/A	N/A	94.0000	0.0006	0.0000	94.00	Option 1: VP50 = .005 VP60 = .007
Toluene						0.3042	N/A	N/A	92.1300	0.0819	0.0080	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.9022	N/A	N/A	62.6608	0.5935	0.5631	103.79	
Xylene (-m)						0.0824	N/A	N/A	106.1700	0.0606	0.0016	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T-582 - Internal Floating Roof Tank
Gallup, NM

Annual Emission Calcaulations

Rim Seal Losses (lb):	911.2964
Seal Factor A (lb-mole/ft-yr):	1.6000
Seal Factor B (lb-mole/ft-yr (mph)^n):	0.3000
Value of Vapor Pressure Function:	0.1269
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	4.5162
Tank Diameter (ft):	67.0000
Vapor Molecular Weight (lb/lb-mole):	67.0000
Product Factor:	1.0000
Withdrawal Losses (lb):	59.7917
Number of Columns:	1.0000
Effective Column Diameter (ft):	1.0000
Annual Net Throughput (gal/yr.):	20,000,000.0000
Shell Clingage Factor (bbl/1000 sqft):	0.0015
Average Organic Liquid Density (lb/gal):	5.8600
Tank Diameter (ft):	67.0000
Deck Fitting Losses (lb):	1,455.1839
Value of Vapor Pressure Function:	0.1269
Vapor Molecular Weight (lb/lb-mole):	67.0000
Product Factor:	1.0000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	171.1800
Deck Seam Losses (lb):	0.0000
Deck Seam Length (ft):	0.0000
Deck Seam Loss per Unit Length Factor (lb-mole/ft-yr):	0.0000
Deck Seam Length Factor(ft/sqft):	0.0000
Tank Diameter (ft):	67.0000
Vapor Molecular Weight (lb/lb-mole):	67.0000
Product Factor:	1.0000
Total Losses (lb):	2,426.2719

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors KFa(lb-mole/yr)	KFb(lb-mole/(yr mph^n))	m	Losses(lb)
Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed	1	36.00	5.90	1.20	306.0324
Automatic Gauge Float Well/Bolted Cover, Gasketed	1	2.80	0.00	0.00	23.8025
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Gask.	1	0.47	0.02	0.97	3.9954
Ladder Well (36-in. Diam.)/Sliding Cover, Gasketed	1	56.00	0.00	0.00	476.0503
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Gasketed	20	1.30	0.08	0.65	221.0234
Sample Pipe or Well (24-in. Diam.)/Slotted Pipe-Sliding Cover, Gask.	1	43.00	0.00	0.00	365.5387
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	52.7056
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1	0.71	0.10	1.00	6.0356

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-582 - Internal Floating Roof Tank
Gallup, NM

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Gasoline (89 Oct. Base) - Ciniza	911.30	59.79	1,455.18	0.00	2,426.27
Isopentane	325.29	7.04	519.43	0.00	851.76
1-Pentene	1.44	0.04	2.30	0.00	3.77
2-Methyl-1-butene	1.61	0.08	2.57	0.00	4.25
Pentane (-n)	33.16	1.05	52.95	0.00	87.15
2-Pentene	4.10	0.14	6.55	0.00	10.80
Hexane (-n)	5.69	0.65	9.09	0.00	15.43
Benzene	5.01	0.94	8.00	0.00	13.96
Cyclohexane	1.48	0.27	2.37	0.00	4.12
2,2,4-Trimethylpentane	11.44	4.24	18.26	0.00	33.94
Toluene	7.28	4.90	11.62	0.00	23.80
Ethylbenzene	0.15	0.31	0.24	0.00	0.70
Xylene (-m)	1.46	3.62	2.33	0.00	7.41
Isopropyl benzene	0.00	0.02	0.01	0.00	0.03
1,2,4-Trimethylbenzene	0.08	0.88	0.13	0.00	1.09
Naphthalene	0.00	0.09	0.00	0.00	0.09
Phenol	0.00	0.03	0.00	0.00	0.04
Unidentified Components	513.11	35.48	819.34	0.00	1,367.93

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T-583
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Vertical Fixed Roof Tank
Description:	Diesel

Tank Dimensions

Shell Height (ft):	40.00
Diameter (ft):	100.00
Liquid Height (ft) :	40.00
Avg. Liquid Height (ft):	20.00
Volume (gallons):	2,310,000.00
Turnovers:	25.11
Net Throughput(gal/yr):	58,000,000.00
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Light
Shell Condition	Good
Roof Color/Shade:	Gray/Light
Roof Condition:	Good

Roof Characteristics

Type:	Cone
Height (ft)	0.50
Slope (ft/ft) (Cone Roof)	0.01

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-583 - Vertical Fixed Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Diesel #2 - Ciniza	All	57.39	44.50	70.27	50.84	0.0066	0.0037	0.0091	130.0000			217.00	Option 1: VP50 = .0045 VP60 = .0074
1,2,4-Trimethylbenzene						0.0184	0.0107	0.0305	120.1900	0.0039	0.0180	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane						0.5522	0.3747	0.7954	114.2300	0.0001	0.0139	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Cyclohexane						1.1282	0.7837	1.5897	84.1600	0.0004	0.1134	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0990	0.0620	0.1539	106.1700	0.0002	0.0050	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Isopropyl benzene						0.0463	0.0279	0.0744	120.2000	0.0001	0.0012	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Naphthalene						0.0022	0.0012	0.0037	128.0000	0.0018	0.0010	128.00	Option 1: VP50 = .0015 VP60 = .0024
Toluene						0.3042	0.2000	0.4512	92.1300	0.0006	0.0459	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.0045	0.0034	0.0034	148.6199	0.9908	0.7582	218.86	
Xylene (-m)						0.0824	0.0513	0.1286	106.1700	0.0021	0.0435	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T-583 - Vertical Fixed Roof Tank
Gallup, NM

Annual Emission Calcaulations

Standing Losses (lb):	847.3328
Vapor Space Volume (cu ft):	158,388.6294
Vapor Density (lb/cu ft):	0.0002
Vapor Space Expansion Factor:	0.0948
Vented Vapor Saturation Factor:	0.9930
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	158,388.6294
Tank Diameter (ft):	100.0000
Vapor Space Outage (ft):	20.1667
Tank Shell Height (ft):	40.0000
Average Liquid Height (ft):	20.0000
Roof Outage (ft):	0.1667
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.1667
Roof Height (ft):	0.5000
Roof Slope (ft/ft):	0.0100
Shell Radius (ft):	50.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0002
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0066
Daily Avg. Liquid Surface Temp. (deg. R):	517.0582
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	510.5100
Tank Paint Solar Absorptance (Shell):	0.5400
Tank Paint Solar Absorptance (Roof):	0.5400
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0948
Daily Vapor Temperature Range (deg. R):	51.5419
Daily Vapor Pressure Range (psia):	0.0054
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0066
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0037
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0091
Daily Avg. Liquid Surface Temp. (deg R):	517.0582
Daily Min. Liquid Surface Temp. (deg R):	504.1727
Daily Max. Liquid Surface Temp. (deg R):	529.9436
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9930
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0066
Vapor Space Outage (ft):	20.1667
Working Losses (lb):	1,192.4986
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0066
Annual Net Throughput (gal/yr.):	58,000,000.0000
Annual Turnovers:	25.1082
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	2,310,000.0000
Maximum Liquid Height (ft):	40.0000
Tank Diameter (ft):	100.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	2,039.8314

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-583 - Vertical Fixed Roof Tank
Gallup, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Diesel #2 - Ciniza	1,192.50	847.33	2,039.83
Cyclohexane	135.23	96.09	231.32
2,2,4-Trimethylpentane	16.55	11.76	28.31
Toluene	54.69	38.86	93.56
Ethylbenzene	5.94	4.22	10.15
Xylene (-m)	51.85	36.84	88.70
Isopropyl benzene	1.39	0.99	2.37
1,2,4-Trimethylbenzene	21.49	15.27	36.76
Naphthalene	1.17	0.83	2.00
Unidentified Components	904.19	642.47	1,546.66

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T-701
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Vertical Fixed Roof Tank
Description:	FCC feed

Tank Dimensions

Shell Height (ft):	33.83
Diameter (ft):	88.50
Liquid Height (ft) :	33.83
Avg. Liquid Height (ft):	25.00
Volume (gallons):	1,554,000.00
Turnovers:	18.02
Net Throughput(gal/yr):	28,000,000.00
Is Tank Heated (y/n):	Y

Paint Characteristics

Shell Color/Shade:	Aluminum/Diffuse
Shell Condition	Good
Roof Color/Shade:	Gray/Light
Roof Condition:	Good

Roof Characteristics

Type:	Cone
Height (ft)	3.00
Slope (ft/ft) (Cone Roof)	0.07

Breather Vent Settings

Vacuum Settings (psig):	0.00
Pressure Settings (psig)	0.00

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-701 - Vertical Fixed Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
FCC Feed - Ciniza	All	150.00	150.00	150.00	150.00	0.0738	0.0738	0.0738	180.0000			420.00	Option 4: RVP=.025, ASTM Slope=8.5

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T-701 - Vertical Fixed Roof Tank
Gallup, NM

Annual Emission Calcaulations

Standing Losses (lb):	0.0000
Vapor Space Volume (cu ft):	60,468.6037
Vapor Density (lb/cu ft):	0.0020
Vapor Space Expansion Factor:	0.0000
Vented Vapor Saturation Factor:	0.9630
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	60,468.6037
Tank Diameter (ft):	88.5000
Vapor Space Outage (ft):	9.8300
Tank Shell Height (ft):	33.8300
Average Liquid Height (ft):	25.0000
Roof Outage (ft):	1.0000
Roof Outage (Cone Roof)	
Roof Outage (ft):	1.0000
Roof Height (ft):	3.0000
Roof Slope (ft/ft):	0.0700
Shell Radius (ft):	44.2500
Vapor Density	
Vapor Density (lb/cu ft):	0.0020
Vapor Molecular Weight (lb/lb-mole):	180.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0738
Daily Avg. Liquid Surface Temp. (deg. R):	609.6700
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	609.6700
Tank Paint Solar Absorptance (Shell):	0.6000
Tank Paint Solar Absorptance (Roof):	0.5400
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0000
Daily Vapor Temperature Range (deg. R):	0.0000
Daily Vapor Pressure Range (psia):	0.0000
Breather Vent Press. Setting Range(psia):	0.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0738
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0738
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0738
Daily Avg. Liquid Surface Temp. (deg R):	609.6700
Daily Min. Liquid Surface Temp. (deg R):	609.6700
Daily Max. Liquid Surface Temp. (deg R):	609.6700
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9630
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0738
Vapor Space Outage (ft):	9.8300
Working Losses (lb):	8,855.3670
Vapor Molecular Weight (lb/lb-mole):	180.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0738
Annual Net Throughput (gal/yr.):	28,000,000.0000
Annual Turnovers:	18.0180
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	1,554,000.0000
Maximum Liquid Height (ft):	33.8300
Tank Diameter (ft):	88.5000
Working Loss Product Factor:	1.0000
Total Losses (lb):	8,855.3670

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-701 - Vertical Fixed Roof Tank
Gallup, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
FCC Feed - Ciniza	8,855.37	0.00	8,855.37

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T-702
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Vertical Fixed Roof Tank
Description:	FCC Feed

Tank Dimensions

Shell Height (ft):	40.42
Diameter (ft):	67.00
Liquid Height (ft) :	40.42
Avg. Liquid Height (ft):	30.00
Volume (gallons):	1,050,000.00
Turnovers:	26.67
Net Throughput(gal/yr):	28,000,000.00
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	Aluminum/Diffuse
Shell Condition	Good
Roof Color/Shade:	Gray/Light
Roof Condition:	Good

Roof Characteristics

Type:	Cone
Height (ft)	2.00
Slope (ft/ft) (Cone Roof)	0.06

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-702 - Vertical Fixed Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
FCC Feed - Ciniza	All	57.91	44.65	71.16	51.02	0.0079	0.0054	0.0115	180.0000			420.00	Option 4: RVP=.025, ASTM Slope=8.5

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T-702 - Vertical Fixed Roof Tank
Gallup, NM

Annual Emission Calcaulations	
Standing Losses (lb):	356.3583
Vapor Space Volume (cu ft):	39,087.7324
Vapor Density (lb/cu ft):	0.0003
Vapor Space Expansion Factor:	0.0977
Vented Vapor Saturation Factor:	0.9954
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	39,087.7324
Tank Diameter (ft):	67.0000
Vapor Space Outage (ft):	11.0867
Tank Shell Height (ft):	40.4200
Average Liquid Height (ft):	30.0000
Roof Outage (ft):	0.6667
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.6667
Roof Height (ft):	2.0000
Roof Slope (ft/ft):	0.0597
Shell Radius (ft):	33.5000
Vapor Density	
Vapor Density (lb/cu ft):	0.0003
Vapor Molecular Weight (lb/lb-mole):	180.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0079
Daily Avg. Liquid Surface Temp. (deg. R):	517.5775
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	510.6900
Tank Paint Solar Absorptance (Shell):	0.6000
Tank Paint Solar Absorptance (Roof):	0.5400
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0977
Daily Vapor Temperature Range (deg. R):	53.0254
Daily Vapor Pressure Range (psia):	0.0061
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0079
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0054
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0115
Daily Avg. Liquid Surface Temp. (deg R):	517.5775
Daily Min. Liquid Surface Temp. (deg R):	504.3212
Daily Max. Liquid Surface Temp. (deg R):	530.8338
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9954
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0079
Vapor Space Outage (ft):	11.0867
Working Losses (lb):	951.2927
Vapor Molecular Weight (lb/lb-mole):	180.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0079
Annual Net Throughput (gal/yr.):	28,000,000.0000
Annual Turnovers:	26.6667
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	1,050,000.0000
Maximum Liquid Height (ft):	40.4200
Tank Diameter (ft):	67.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	1,307.6510

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-702 - Vertical Fixed Roof Tank
Gallup, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
FCC Feed - Ciniza	951.29	356.36	1,307.65

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T-703
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Vertical Fixed Roof Tank
Description:	Recovered Oil/FCC feed

Tank Dimensions

Shell Height (ft):	39.66
Diameter (ft):	67.00
Liquid Height (ft) :	39.66
Avg. Liquid Height (ft):	35.00
Volume (gallons):	1,045,981.00
Turnovers:	26.67
Net Throughput(gal/yr):	28,000,000.00
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Light
Shell Condition	Good
Roof Color/Shade:	Gray/Light
Roof Condition:	Good

Roof Characteristics

Type:	Cone
Height (ft)	2.00
Slope (ft/ft) (Cone Roof)	0.06

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-703 - Vertical Fixed Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Recovered Oil - Ciniza	All	57.39	44.50	70.27	50.84	0.7478	0.4901	1.1082	105.0000			184.00	Option 1: VP50 = .6 VP60 = .8
1,2,4-Trimethylbenzene						0.0184	0.0107	0.0305	120.1900	0.0114	0.0005	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane						0.5522	0.3747	0.7954	114.2300	0.0064	0.0083	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
2-Methyl-1-butene						4.2310	3.1959	5.5147	70.1300	0.0016	0.0159	70.13	Option 2: A=6.4863, B=1039.69, C=236.65
Benzene						1.0858	0.7476	1.5425	78.1100	0.0057	0.0145	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.1282	0.7837	1.5897	84.1600	0.0066	0.0174	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0990	0.0620	0.1539	106.1700	0.0051	0.0012	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.7870	1.2595	2.4843	86.1700	0.0100	0.0419	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopentane						9.4523	6.7835	12.6067	72.1500	0.0195	0.4320	72.15	Option 1: VP50 = 7.889 VP60 = 10.005
Isopropyl benzene						0.0463	0.0279	0.0744	120.2000	0.0006	0.0001	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Naphthalene						0.0022	0.0012	0.0037	128.0000	0.0024	0.0000	128.00	Option 1: VP50 = .0015 VP60 = .0024
Pentane (-n)						6.4487	4.7951	8.5487	72.1500	0.0094	0.1421	72.15	Option 3: A=27691, B=7.558
Toluene						0.3042	0.2000	0.4512	92.1300	0.0242	0.0173	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.0146	-0.3290	-0.3290	2,217.9922	0.8695	0.3037	217.45	
Xylene (-m)						0.0824	0.0513	0.1286	106.1700	0.0276	0.0053	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T-703 - Vertical Fixed Roof Tank
Gallup, NM

Annual Emission Calcaulations

Standing Losses (lb):	12,219.9941
Vapor Space Volume (cu ft):	18,779.9749
Vapor Density (lb/cu ft):	0.0142
Vapor Space Expansion Factor:	0.1526
Vented Vapor Saturation Factor:	0.8257
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	18,779.9749
Tank Diameter (ft):	67.0000
Vapor Space Outage (ft):	5.3267
Tank Shell Height (ft):	39.6600
Average Liquid Height (ft):	35.0000
Roof Outage (ft):	0.6667
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.6667
Roof Height (ft):	2.0000
Roof Slope (ft/ft):	0.0597
Shell Radius (ft):	33.5000
Vapor Density	
Vapor Density (lb/cu ft):	0.0142
Vapor Molecular Weight (lb/lb-mole):	105.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.7478
Daily Avg. Liquid Surface Temp. (deg. R):	517.0582
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	510.5100
Tank Paint Solar Absorptance (Shell):	0.5400
Tank Paint Solar Absorptance (Roof):	0.5400
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.1526
Daily Vapor Temperature Range (deg. R):	51.5419
Daily Vapor Pressure Range (psia):	0.6182
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.7478
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.4901
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	1.1082
Daily Avg. Liquid Surface Temp. (deg R):	517.0582
Daily Min. Liquid Surface Temp. (deg R):	504.1727
Daily Max. Liquid Surface Temp. (deg R):	529.9436
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.8257
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.7478
Vapor Space Outage (ft):	5.3267
Working Losses (lb):	39,257.5638
Vapor Molecular Weight (lb/lb-mole):	105.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.7478
Annual Net Throughput (gal/yr.):	28,000,000.0000
Annual Turnovers:	26.6667
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	1,045,981.0000
Maximum Liquid Height (ft):	39.6600
Tank Diameter (ft):	67.0000
Working Loss Product Factor:	0.7500
Total Losses (lb):	51,477.5579

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-703 - Vertical Fixed Roof Tank
Gallup, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Recovered Oil - Ciniza	39,257.56	12,219.99	51,477.56
Isopentane	16,957.49	5,278.48	22,235.97
2-Methyl-1-butene	622.80	193.86	816.66
Pentane (-n)	5,576.87	1,735.95	7,312.82
Hexane (-n)	1,644.02	511.75	2,155.76
Benzene	569.38	177.24	746.62
Cyclohexane	685.04	213.24	898.27
2,2,4-Trimethylpentane	325.16	101.22	426.38
Toluene	677.26	210.82	888.08
Ethylbenzene	46.47	14.47	60.94
Xylene (-m)	209.23	65.13	274.35
1,2,4-Trimethylbenzene	19.29	6.00	25.29
Naphthalene	0.48	0.15	0.63
Isopropyl benzene	2.56	0.80	3.35
Unidentified Components	11,921.53	3,710.90	15,632.43

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T-704
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Vertical Fixed Roof Tank
Description:	Recovered Oil

Tank Dimensions

Shell Height (ft):	32.00
Diameter (ft):	47.00
Liquid Height (ft) :	32.00
Avg. Liquid Height (ft):	25.00
Volume (gallons):	420,000.00
Turnovers:	2.86
Net Throughput(gal/yr):	1,200,000.00
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Light
Shell Condition	Good
Roof Color/Shade:	Gray/Light
Roof Condition:	Good

Roof Characteristics

Type:	Cone
Height (ft)	1.50
Slope (ft/ft) (Cone Roof)	0.06

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-704 - Vertical Fixed Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Recovered Oil - Ciniza	All	57.39	44.50	70.27	50.84	0.7478	0.4901	1.1082	105.0000			184.00	Option 1: VP50 = .6 VP60 = .8
1,2,4-Trimethylbenzene						0.0184	0.0107	0.0305	120.1900	0.0114	0.0005	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane						0.5522	0.3747	0.7954	114.2300	0.0064	0.0083	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
2-Methyl-1-butene						4.2310	3.1959	5.5147	70.1300	0.0016	0.0159	70.13	Option 2: A=6.4863, B=1039.69, C=236.65
Benzene						1.0858	0.7476	1.5425	78.1100	0.0057	0.0145	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.1282	0.7837	1.5897	84.1600	0.0066	0.0174	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0990	0.0620	0.1539	106.1700	0.0051	0.0012	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.7870	1.2595	2.4843	86.1700	0.0100	0.0419	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopentane						9.4523	6.7835	12.6067	72.1500	0.0195	0.4320	72.15	Option 1: VP50 = 7.889 VP60 = 10.005
Isopropyl benzene						0.0463	0.0279	0.0744	120.2000	0.0006	0.0001	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Naphthalene						0.0022	0.0012	0.0037	128.0000	0.0024	0.0000	128.00	Option 1: VP50 = .0015 VP60 = .0024
Pentane (-n)						6.4487	4.7951	8.5487	72.1500	0.0094	0.1421	72.15	Option 3: A=27691, B=7.558
Toluene						0.3042	0.2000	0.4512	92.1300	0.0242	0.0173	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.0146	-0.3290	-0.3290	2,217.9922	0.8695	0.3037	217.45	
Xylene (-m)						0.0824	0.0513	0.1286	106.1700	0.0276	0.0053	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T-704 - Vertical Fixed Roof Tank
Gallup, NM

Annual Emission Calcaulations

Standing Losses (lb):	7,904.6960
Vapor Space Volume (cu ft):	13,012.0841
Vapor Density (lb/cu ft):	0.0142
Vapor Space Expansion Factor:	0.1526
Vented Vapor Saturation Factor:	0.7709
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	13,012.0841
Tank Diameter (ft):	47.0000
Vapor Space Outage (ft):	7.5000
Tank Shell Height (ft):	32.0000
Average Liquid Height (ft):	25.0000
Roof Outage (ft):	0.5000
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.5000
Roof Height (ft):	1.5000
Roof Slope (ft/ft):	0.0638
Shell Radius (ft):	23.5000
Vapor Density	
Vapor Density (lb/cu ft):	0.0142
Vapor Molecular Weight (lb/lb-mole):	105.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.7478
Daily Avg. Liquid Surface Temp. (deg. R):	517.0582
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	510.5100
Tank Paint Solar Absorptance (Shell):	0.5400
Tank Paint Solar Absorptance (Roof):	0.5400
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.1526
Daily Vapor Temperature Range (deg. R):	51.5419
Daily Vapor Pressure Range (psia):	0.6182
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.7478
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.4901
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	1.1082
Daily Avg. Liquid Surface Temp. (deg R):	517.0582
Daily Min. Liquid Surface Temp. (deg R):	504.1727
Daily Max. Liquid Surface Temp. (deg R):	529.9436
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.7709
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.7478
Vapor Space Outage (ft):	7.5000
Working Losses (lb):	1,682.4670
Vapor Molecular Weight (lb/lb-mole):	105.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.7478
Annual Net Throughput (gal/yr.):	1,200,000.0000
Annual Turnovers:	2.8571
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	420,000.0000
Maximum Liquid Height (ft):	32.0000
Tank Diameter (ft):	47.0000
Working Loss Product Factor:	0.7500
Total Losses (lb):	9,587.1630

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-704 - Vertical Fixed Roof Tank
Gallup, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Recovered Oil - Ciniza	1,682.47	7,904.70	9,587.16
Isopentane	726.75	3,414.47	4,141.22
2-Methyl-1-butene	26.69	125.40	152.09
Pentane (-n)	239.01	1,122.93	1,361.94
Hexane (-n)	70.46	331.03	401.49
Benzene	24.40	114.65	139.05
Cyclohexane	29.36	137.94	167.29
2,2,4-Trimethylpentane	13.94	65.47	79.41
Toluene	29.03	136.37	165.40
Ethylbenzene	1.99	9.36	11.35
Xylene (-m)	8.97	42.13	51.10
1,2,4-Trimethylbenzene	0.83	3.88	4.71
Naphthalene	0.02	0.10	0.12
Isopropyl benzene	0.11	0.51	0.62
Unidentified Components	510.92	2,400.46	2,911.38

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T-705
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Vertical Fixed Roof Tank
Description:	Recovered Oil

Tank Dimensions

Shell Height (ft):	32.00
Diameter (ft):	47.00
Liquid Height (ft) :	31.92
Avg. Liquid Height (ft):	25.00
Volume (gallons):	420,000.00
Turnovers:	2.86
Net Throughput(gal/yr):	1,200,000.00
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	Aluminum/Diffuse
Shell Condition	Good
Roof Color/Shade:	Gray/Light
Roof Condition:	Good

Roof Characteristics

Type:	Cone
Height (ft)	1.50
Slope (ft/ft) (Cone Roof)	0.06

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-705 - Vertical Fixed Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Recovered Oil - Ciniza	All	57.91	44.65	71.16	51.02	0.7581	0.4930	1.1349	105.0000			184.00	Option 1: VP50 = .6 VP60 = .8
1,2,4-Trimethylbenzene						0.0188	0.0108	0.0316	120.1900	0.0114	0.0005	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane						0.5607	0.3765	0.8150	114.2300	0.0064	0.0083	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
2-Methyl-1-butene						4.2776	3.2065	5.6135	70.1300	0.0016	0.0158	70.13	Option 2: A=6.4863, B=1039.69, C=236.65
Benzene						1.1017	0.7509	1.5791	78.1100	0.0057	0.0145	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.1444	0.7871	1.6267	84.1600	0.0066	0.0175	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1009	0.0623	0.1585	106.1700	0.0051	0.0012	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.8116	1.2647	2.5397	86.1700	0.0100	0.0419	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopentane						9.5622	6.8133	12.8563	72.1500	0.0195	0.4310	72.15	Option 1: VP50 = 7.889 VP60 = 10.005
Isopropyl benzene						0.0472	0.0281	0.0768	120.2000	0.0006	0.0001	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Naphthalene						0.0022	0.0012	0.0039	128.0000	0.0024	0.0000	128.00	Option 1: VP50 = .0015 VP60 = .0024
Pentane (-n)						6.5242	4.8119	8.7124	72.1500	0.0094	0.1418	72.15	Option 3: A=27691, B=7.558
Toluene						0.3092	0.2010	0.4632	92.1300	0.0242	0.0173	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.0167	-0.3421	-0.3421	1,978.3298	0.8695	0.3049	217.45	
Xylene (-m)						0.0839	0.0516	0.1324	106.1700	0.0276	0.0054	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T-705 - Vertical Fixed Roof Tank
Gallup, NM

Annual Emission Calcaulations	
Standing Losses (lb):	8,246.2478
Vapor Space Volume (cu ft):	13,012.0841
Vapor Density (lb/cu ft):	0.0143
Vapor Space Expansion Factor:	0.1576
Vented Vapor Saturation Factor:	0.7684
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	13,012.0841
Tank Diameter (ft):	47.0000
Vapor Space Outage (ft):	7.5000
Tank Shell Height (ft):	32.0000
Average Liquid Height (ft):	25.0000
Roof Outage (ft):	0.5000
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.5000
Roof Height (ft):	1.5000
Roof Slope (ft/ft):	0.0600
Shell Radius (ft):	23.5000
Vapor Density	
Vapor Density (lb/cu ft):	0.0143
Vapor Molecular Weight (lb/lb-mole):	105.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.7581
Daily Avg. Liquid Surface Temp. (deg. R):	517.5775
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	510.6900
Tank Paint Solar Absorptance (Shell):	0.6000
Tank Paint Solar Absorptance (Roof):	0.5400
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.1576
Daily Vapor Temperature Range (deg. R):	53.0254
Daily Vapor Pressure Range (psia):	0.6419
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.7581
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.4930
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	1.1349
Daily Avg. Liquid Surface Temp. (deg R):	517.5775
Daily Min. Liquid Surface Temp. (deg R):	504.3212
Daily Max. Liquid Surface Temp. (deg R):	530.8338
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.7684
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.7581
Vapor Space Outage (ft):	7.5000
Working Losses (lb):	1,705.8374
Vapor Molecular Weight (lb/lb-mole):	105.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.7581
Annual Net Throughput (gal/yr.):	1,200,000.0000
Annual Turnovers:	2.8571
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	420,000.0000
Maximum Liquid Height (ft):	31.9200
Tank Diameter (ft):	47.0000
Working Loss Product Factor:	0.7500
Total Losses (lb):	9,952.0852

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-705 - Vertical Fixed Roof Tank
Gallup, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Recovered Oil - Ciniza	1,705.84	8,246.25	9,952.09
Isopentane	735.20	3,554.05	4,289.25
2-Methyl-1-butene	26.99	130.45	157.44
Pentane (-n)	241.81	1,168.92	1,410.72
Hexane (-n)	71.43	345.29	416.71
Benzene	24.76	119.69	144.45
Cyclohexane	29.78	143.96	173.74
2,2,4-Trimethylpentane	14.15	68.39	82.54
Toluene	29.50	142.63	172.13
Ethylbenzene	2.03	9.81	11.83
Xylene (-m)	9.13	44.15	53.29
1,2,4-Trimethylbenzene	0.84	4.08	4.93
Naphthalene	0.02	0.10	0.12
Isopropyl benzene	0.11	0.54	0.65
Unidentified Components	520.09	2,514.19	3,034.28

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T-706
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Vertical Fixed Roof Tank
Description:	Fuel oil

Tank Dimensions

Shell Height (ft):	32.00
Diameter (ft):	47.00
Liquid Height (ft) :	30.00
Avg. Liquid Height (ft):	25.00
Volume (gallons):	420,000.00
Turnovers:	2.86
Net Throughput(gal/yr):	1,200,000.00
Is Tank Heated (y/n):	Y

Paint Characteristics

Shell Color/Shade:	Aluminum/Diffuse
Shell Condition	Good
Roof Color/Shade:	Gray/Light
Roof Condition:	Good

Roof Characteristics

Type:	Cone
Height (ft)	1.50
Slope (ft/ft) (Cone Roof)	0.06

Breather Vent Settings

Vacuum Settings (psig):	0.00
Pressure Settings (psig)	0.00

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-706 - Vertical Fixed Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Fuel Oil - Ciniza	All	175.00	175.00	175.00	175.00	0.0113	0.0113	0.0113	180.0000			365.00	Option 4: RVP=.0012, ASTM Slope=4.6
Naphthalene						0.0110	0.0110	0.0110	128.0000	0.0001	0.0002	128.00	
Unidentified Components						0.0113	0.0113	0.0113	180.0144	0.9999	0.9998	365.07	

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T-706 - Vertical Fixed Roof Tank
Gallup, NM

Annual Emission Calcaulations	
Standing Losses (lb):	0.0000
Vapor Space Volume (cu ft):	13,012.0841
Vapor Density (lb/cu ft):	0.0003
Vapor Space Expansion Factor:	0.0000
Vented Vapor Saturation Factor:	0.9955
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	13,012.0841
Tank Diameter (ft):	47.0000
Vapor Space Outage (ft):	7.5000
Tank Shell Height (ft):	32.0000
Average Liquid Height (ft):	25.0000
Roof Outage (ft):	0.5000
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.5000
Roof Height (ft):	1.5000
Roof Slope (ft/ft):	0.0600
Shell Radius (ft):	23.5000
Vapor Density	
Vapor Density (lb/cu ft):	0.0003
Vapor Molecular Weight (lb/lb-mole):	180.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0113
Daily Avg. Liquid Surface Temp. (deg. R):	634.6700
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	634.6700
Tank Paint Solar Absorptance (Shell):	0.6000
Tank Paint Solar Absorptance (Roof):	0.5400
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0000
Daily Vapor Temperature Range (deg. R):	0.0000
Daily Vapor Pressure Range (psia):	0.0000
Breather Vent Press. Setting Range(psia):	0.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0113
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0113
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0113
Daily Avg. Liquid Surface Temp. (deg R):	634.6700
Daily Min. Liquid Surface Temp. (deg R):	634.6700
Daily Max. Liquid Surface Temp. (deg R):	634.6700
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9955
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0113
Vapor Space Outage (ft):	7.5000
Working Losses (lb):	58.3021
Vapor Molecular Weight (lb/lb-mole):	180.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0113
Annual Net Throughput (gal/yr.):	1,200,000.0000
Annual Turnovers:	2.8571
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	420,000.0000
Maximum Liquid Height (ft):	30.0000
Tank Diameter (ft):	47.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	58.3021

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-706 - Vertical Fixed Roof Tank
Gallup, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Fuel Oil - Ciniza	58.30	0.00	58.30
Naphthalene	0.01	0.00	0.01
Unidentified Components	58.29	0.00	58.29

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T-707
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Vertical Fixed Roof Tank
Description:	Recovered oil

Tank Dimensions

Shell Height (ft):	18.00
Diameter (ft):	27.00
Liquid Height (ft) :	18.00
Avg. Liquid Height (ft):	15.00
Volume (gallons):	71,400.00
Turnovers:	1.26
Net Throughput(gal/yr):	90,000.00
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Light
Shell Condition	Good
Roof Color/Shade:	Gray/Light
Roof Condition:	Good

Roof Characteristics

Type:	Cone
Height (ft)	1.00
Slope (ft/ft) (Cone Roof)	0.07

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-707 - Vertical Fixed Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Recovered Oil - Ciniza	All	57.39	44.50	70.27	50.84	0.7478	0.4901	1.1082	105.0000			184.00	Option 1: VP50 = .6 VP60 = .8
1,2,4-Trimethylbenzene						0.0184	0.0107	0.0305	120.1900	0.0114	0.0005	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane						0.5522	0.3747	0.7954	114.2300	0.0064	0.0083	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
2-Methyl-1-butene						4.2310	3.1959	5.5147	70.1300	0.0016	0.0159	70.13	Option 2: A=6.4863, B=1039.69, C=236.65
Benzene						1.0858	0.7476	1.5425	78.1100	0.0057	0.0145	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.1282	0.7837	1.5897	84.1600	0.0066	0.0174	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0990	0.0620	0.1539	106.1700	0.0051	0.0012	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.7870	1.2595	2.4843	86.1700	0.0100	0.0419	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopentane						9.4523	6.7835	12.6067	72.1500	0.0195	0.4320	72.15	Option 1: VP50 = 7.889 VP60 = 10.005
Isopropyl benzene						0.0463	0.0279	0.0744	120.2000	0.0006	0.0001	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Naphthalene						0.0022	0.0012	0.0037	128.0000	0.0024	0.0000	128.00	Option 1: VP50 = .0015 VP60 = .0024
Pentane (-n)						6.4487	4.7951	8.5487	72.1500	0.0094	0.1421	72.15	Option 3: A=27691, B=7.558
Toluene						0.3042	0.2000	0.4512	92.1300	0.0242	0.0173	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.0146	-0.3290	-0.3290	2,217.9922	0.8695	0.3037	217.45	
Xylene (-m)						0.0824	0.0513	0.1286	106.1700	0.0276	0.0053	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T-707 - Vertical Fixed Roof Tank
Gallup, NM

Annual Emission Calcaulations	
Standing Losses (lb):	1,328.5159
Vapor Space Volume (cu ft):	1,908.5175
Vapor Density (lb/cu ft):	0.0142
Vapor Space Expansion Factor:	0.1526
Vented Vapor Saturation Factor:	0.8833
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	1,908.5175
Tank Diameter (ft):	27.0000
Vapor Space Outage (ft):	3.3333
Tank Shell Height (ft):	18.0000
Average Liquid Height (ft):	15.0000
Roof Outage (ft):	0.3333
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.3333
Roof Height (ft):	1.0000
Roof Slope (ft/ft):	0.0741
Shell Radius (ft):	13.5000
Vapor Density	
Vapor Density (lb/cu ft):	0.0142
Vapor Molecular Weight (lb/lb-mole):	105.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.7478
Daily Avg. Liquid Surface Temp. (deg. R):	517.0582
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	510.5100
Tank Paint Solar Absorptance (Shell):	0.5400
Tank Paint Solar Absorptance (Roof):	0.5400
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.1526
Daily Vapor Temperature Range (deg. R):	51.5419
Daily Vapor Pressure Range (psia):	0.6182
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.7478
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.4901
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	1.1082
Daily Avg. Liquid Surface Temp. (deg R):	517.0582
Daily Min. Liquid Surface Temp. (deg R):	504.1727
Daily Max. Liquid Surface Temp. (deg R):	529.9436
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.8833
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.7478
Vapor Space Outage (ft):	3.3333
Working Losses (lb):	126.1850
Vapor Molecular Weight (lb/lb-mole):	105.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.7478
Annual Net Throughput (gal/yr.):	90,000.0000
Annual Turnovers:	1.2605
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	71,400.0000
Maximum Liquid Height (ft):	18.0000
Tank Diameter (ft):	27.0000
Working Loss Product Factor:	0.7500
Total Losses (lb):	1,454.7010

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-707 - Vertical Fixed Roof Tank
Gallup, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Recovered Oil - Ciniza	126.19	1,328.52	1,454.70
Isopentane	54.51	573.86	628.36
2-Methyl-1-butene	2.00	21.08	23.08
Pentane (-n)	17.93	188.73	206.65
Hexane (-n)	5.28	55.64	60.92
Benzene	1.83	19.27	21.10
Cyclohexane	2.20	23.18	25.38
2,2,4-Trimethylpentane	1.05	11.00	12.05
Toluene	2.18	22.92	25.10
Ethylbenzene	0.15	1.57	1.72
Xylene (-m)	0.67	7.08	7.75
1,2,4-Trimethylbenzene	0.06	0.65	0.71
Naphthalene	0.00	0.02	0.02
Isopropyl benzene	0.01	0.09	0.09
Unidentified Components	38.32	403.44	441.76

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification	
User Identification:	T-708
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Vertical Fixed Roof Tank
Description:	Recovered oil
Tank Dimensions	
Shell Height (ft):	15.00
Diameter (ft):	23.00
Liquid Height (ft) :	15.00
Avg. Liquid Height (ft):	10.00
Volume (gallons):	42,000.00
Turnovers:	5.24
Net Throughput(gal/yr):	220,000.00
Is Tank Heated (y/n):	N
Paint Characteristics	
Shell Color/Shade:	Aluminum/Diffuse
Shell Condition	Good
Roof Color/Shade:	Gray/Light
Roof Condition:	Good
Roof Characteristics	
Type:	Cone
Height (ft)	0.75
Slope (ft/ft) (Cone Roof)	0.07
Breather Vent Settings	
Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-708 - Vertical Fixed Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Recovered Oil - Ciniza	All	57.91	44.65	71.16	51.02	0.7581	0.4930	1.1349	105.0000			184.00	Option 1: VP50 = .6 VP60 = .8
1,2,4-Trimethylbenzene						0.0188	0.0108	0.0316	120.1900	0.0114	0.0005	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane						0.5607	0.3765	0.8150	114.2300	0.0064	0.0083	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
2-Methyl-1-butene						4.2776	3.2065	5.6135	70.1300	0.0016	0.0158	70.13	Option 2: A=6.4863, B=1039.69, C=236.65
Benzene						1.1017	0.7509	1.5791	78.1100	0.0057	0.0145	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.1444	0.7871	1.6267	84.1600	0.0066	0.0175	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1009	0.0623	0.1585	106.1700	0.0051	0.0012	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.8116	1.2647	2.5397	86.1700	0.0100	0.0419	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopentane						9.5622	6.8133	12.8563	72.1500	0.0195	0.4310	72.15	Option 1: VP50 = 7.889 VP60 = 10.005
Isopropyl benzene						0.0472	0.0281	0.0768	120.2000	0.0006	0.0001	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Naphthalene						0.0022	0.0012	0.0039	128.0000	0.0024	0.0000	128.00	Option 1: VP50 = .0015 VP60 = .0024
Pentane (-n)						6.5242	4.8119	8.7124	72.1500	0.0094	0.1418	72.15	Option 3: A=27691, B=7.558
Toluene						0.3092	0.2010	0.4632	92.1300	0.0242	0.0173	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.0167	-0.3421	-0.3421	1,978.3298	0.8695	0.3049	217.45	
Xylene (-m)						0.0839	0.0516	0.1324	106.1700	0.0276	0.0054	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T-708 - Vertical Fixed Roof Tank
Gallup, NM

Annual Emission Calcaulations	
Standing Losses (lb):	1,485.5432
Vapor Space Volume (cu ft):	2,181.2470
Vapor Density (lb/cu ft):	0.0143
Vapor Space Expansion Factor:	0.1576
Vented Vapor Saturation Factor:	0.8258
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	2,181.2470
Tank Diameter (ft):	23.0000
Vapor Space Outage (ft):	5.2500
Tank Shell Height (ft):	15.0000
Average Liquid Height (ft):	10.0000
Roof Outage (ft):	0.2500
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.2500
Roof Height (ft):	0.7500
Roof Slope (ft/ft):	0.0652
Shell Radius (ft):	11.5000
Vapor Density	
Vapor Density (lb/cu ft):	0.0143
Vapor Molecular Weight (lb/lb-mole):	105.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.7581
Daily Avg. Liquid Surface Temp. (deg. R):	517.5775
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	510.6900
Tank Paint Solar Absorptance (Shell):	0.6000
Tank Paint Solar Absorptance (Roof):	0.5400
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.1576
Daily Vapor Temperature Range (deg. R):	53.0254
Daily Vapor Pressure Range (psia):	0.6419
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.7581
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.4930
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	1.1349
Daily Avg. Liquid Surface Temp. (deg R):	517.5775
Daily Min. Liquid Surface Temp. (deg R):	504.3212
Daily Max. Liquid Surface Temp. (deg R):	530.8338
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.8258
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.7581
Vapor Space Outage (ft):	5.2500
Working Losses (lb):	312.7369
Vapor Molecular Weight (lb/lb-mole):	105.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.7581
Annual Net Throughput (gal/yr.):	220,000.0000
Annual Turnovers:	5.2381
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	42,000.0000
Maximum Liquid Height (ft):	15.0000
Tank Diameter (ft):	23.0000
Working Loss Product Factor:	0.7500
Total Losses (lb):	1,798.2800

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-708 - Vertical Fixed Roof Tank
Gallup, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Recovered Oil - Ciniza	312.74	1,485.54	1,798.28
Isopentane	134.79	640.25	775.04
2-Methyl-1-butene	4.95	23.50	28.45
Pentane (-n)	44.33	210.58	254.91
Hexane (-n)	13.09	62.20	75.30
Benzene	4.54	21.56	26.10
Cyclohexane	5.46	25.93	31.39
2,2,4-Trimethylpentane	2.59	12.32	14.91
Toluene	5.41	25.69	31.10
Ethylbenzene	0.37	1.77	2.14
Xylene (-m)	1.67	7.95	9.63
1,2,4-Trimethylbenzene	0.15	0.74	0.89
Naphthalene	0.00	0.02	0.02
Isopropyl benzene	0.02	0.10	0.12
Unidentified Components	95.35	452.92	548.27

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T-709
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Vertical Fixed Roof Tank
Description:	Recovered oil

Tank Dimensions

Shell Height (ft):	15.00
Diameter (ft):	23.00
Liquid Height (ft) :	15.00
Avg. Liquid Height (ft):	10.00
Volume (gallons):	42,000.00
Turnovers:	5.24
Net Throughput(gal/yr):	220,000.00
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	Aluminum/Diffuse
Shell Condition	Good
Roof Color/Shade:	Gray/Light
Roof Condition:	Good

Roof Characteristics

Type:	Cone
Height (ft)	0.75
Slope (ft/ft) (Cone Roof)	0.07

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-709 - Vertical Fixed Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Recovered Oil - Ciniza	All	57.91	44.65	71.16	51.02	0.7581	0.4930	1.1349	105.0000			184.00	Option 1: VP50 = .6 VP60 = .8
1,2,4-Trimethylbenzene						0.0188	0.0108	0.0316	120.1900	0.0114	0.0005	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane						0.5607	0.3765	0.8150	114.2300	0.0064	0.0083	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
2-Methyl-1-butene						4.2776	3.2065	5.6135	70.1300	0.0016	0.0158	70.13	Option 2: A=6.4863, B=1039.69, C=236.65
Benzene						1.1017	0.7509	1.5791	78.1100	0.0057	0.0145	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.1444	0.7871	1.6267	84.1600	0.0066	0.0175	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1009	0.0623	0.1585	106.1700	0.0051	0.0012	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.8116	1.2647	2.5397	86.1700	0.0100	0.0419	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopentane						9.5622	6.8133	12.8563	72.1500	0.0195	0.4310	72.15	Option 1: VP50 = 7.889 VP60 = 10.005
Isopropyl benzene						0.0472	0.0281	0.0768	120.2000	0.0006	0.0001	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Naphthalene						0.0022	0.0012	0.0039	128.0000	0.0024	0.0000	128.00	Option 1: VP50 = .0015 VP60 = .0024
Pentane (-n)						6.5242	4.8119	8.7124	72.1500	0.0094	0.1418	72.15	Option 3: A=27691, B=7.558
Toluene						0.3092	0.2010	0.4632	92.1300	0.0242	0.0173	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.0167	-0.3421	-0.3421	1,978.3298	0.8695	0.3049	217.45	
Xylene (-m)						0.0839	0.0516	0.1324	106.1700	0.0276	0.0054	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T-709 - Vertical Fixed Roof Tank
Gallup, NM

Annual Emission Calcaulations

Standing Losses (lb):	1,485.5432
Vapor Space Volume (cu ft):	2,181.2470
Vapor Density (lb/cu ft):	0.0143
Vapor Space Expansion Factor:	0.1576
Vented Vapor Saturation Factor:	0.8258
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	2,181.2470
Tank Diameter (ft):	23.0000
Vapor Space Outage (ft):	5.2500
Tank Shell Height (ft):	15.0000
Average Liquid Height (ft):	10.0000
Roof Outage (ft):	0.2500
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.2500
Roof Height (ft):	0.7500
Roof Slope (ft/ft):	0.0652
Shell Radius (ft):	11.5000
Vapor Density	
Vapor Density (lb/cu ft):	0.0143
Vapor Molecular Weight (lb/lb-mole):	105.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.7581
Daily Avg. Liquid Surface Temp. (deg. R):	517.5775
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	510.6900
Tank Paint Solar Absorptance (Shell):	0.6000
Tank Paint Solar Absorptance (Roof):	0.5400
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.1576
Daily Vapor Temperature Range (deg. R):	53.0254
Daily Vapor Pressure Range (psia):	0.6419
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.7581
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.4930
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	1.1349
Daily Avg. Liquid Surface Temp. (deg R):	517.5775
Daily Min. Liquid Surface Temp. (deg R):	504.3212
Daily Max. Liquid Surface Temp. (deg R):	530.8338
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.8258
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.7581
Vapor Space Outage (ft):	5.2500
Working Losses (lb):	312.7369
Vapor Molecular Weight (lb/lb-mole):	105.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.7581
Annual Net Throughput (gal/yr.):	220,000.0000
Annual Turnovers:	5.2381
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	42,000.0000
Maximum Liquid Height (ft):	15.0000
Tank Diameter (ft):	23.0000
Working Loss Product Factor:	0.7500
Total Losses (lb):	1,798.2800

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-709 - Vertical Fixed Roof Tank
Gallup, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Recovered Oil - Ciniza	312.74	1,485.54	1,798.28
Isopentane	134.79	640.25	775.04
2-Methyl-1-butene	4.95	23.50	28.45
Pentane (-n)	44.33	210.58	254.91
Hexane (-n)	13.09	62.20	75.30
Benzene	4.54	21.56	26.10
Cyclohexane	5.46	25.93	31.39
2,2,4-Trimethylpentane	2.59	12.32	14.91
Toluene	5.41	25.69	31.10
Ethylbenzene	0.37	1.77	2.14
Xylene (-m)	1.67	7.95	9.63
1,2,4-Trimethylbenzene	0.15	0.74	0.89
Naphthalene	0.00	0.02	0.02
Isopropyl benzene	0.02	0.10	0.12
Unidentified Components	95.35	452.92	548.27

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T-714
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Vertical Fixed Roof Tank
Description:	FCC feed

Tank Dimensions

Shell Height (ft):	40.00
Diameter (ft):	73.00
Liquid Height (ft) :	40.00
Avg. Liquid Height (ft):	30.00
Volume (gallons):	1,218,000.00
Turnovers:	22.99
Net Throughput(gal/yr):	28,000,000.00
Is Tank Heated (y/n):	Y

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Roof Characteristics

Type:	Cone
Height (ft)	2.00
Slope (ft/ft) (Cone Roof)	0.05

Breather Vent Settings

Vacuum Settings (psig):	0.00
Pressure Settings (psig)	0.00

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-714 - Vertical Fixed Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
FCC Feed - Ciniza	All	100.00	100.00	100.00	100.00	0.0241	0.0241	0.0241	180.0000			420.00	Option 4: RVP=.025, ASTM Slope=8.5

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T-714 - Vertical Fixed Roof Tank
Gallup, NM

Annual Emission Calcaulations	
Standing Losses (lb):	0.0000
Vapor Space Volume (cu ft):	44,644.1260
Vapor Density (lb/cu ft):	0.0007
Vapor Space Expansion Factor:	0.0000
Vented Vapor Saturation Factor:	0.9866
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	44,644.1260
Tank Diameter (ft):	73.0000
Vapor Space Outage (ft):	10.6667
Tank Shell Height (ft):	40.0000
Average Liquid Height (ft):	30.0000
Roof Outage (ft):	0.6667
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.6667
Roof Height (ft):	2.0000
Roof Slope (ft/ft):	0.0548
Shell Radius (ft):	36.5000
Vapor Density	
Vapor Density (lb/cu ft):	0.0007
Vapor Molecular Weight (lb/lb-mole):	180.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0241
Daily Avg. Liquid Surface Temp. (deg. R):	559.6700
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	559.6700
Tank Paint Solar Absorptance (Shell):	0.1700
Tank Paint Solar Absorptance (Roof):	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0000
Daily Vapor Temperature Range (deg. R):	0.0000
Daily Vapor Pressure Range (psia):	0.0000
Breather Vent Press. Setting Range(psia):	0.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0241
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0241
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0241
Daily Avg. Liquid Surface Temp. (deg R):	559.6700
Daily Min. Liquid Surface Temp. (deg R):	559.6700
Daily Max. Liquid Surface Temp. (deg R):	559.6700
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9866
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0241
Vapor Space Outage (ft):	10.6667
Working Losses (lb):	2,888.8631
Vapor Molecular Weight (lb/lb-mole):	180.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0241
Annual Net Throughput (gal/yr.):	28,000,000.0000
Annual Turnovers:	22.9885
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	1,218,000.0000
Maximum Liquid Height (ft):	40.0000
Tank Diameter (ft):	73.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	2,888.8631

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

T-714 - Vertical Fixed Roof Tank
Gallup, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
FCC Feed - Ciniza	2,888.86	0.00	2,888.86

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Not VOC - T-716
City:	Gallup
State:	NM
Company:	Giant Refining Company
Type of Tank:	Vertical Fixed Roof Tank
Description:	Ammonium Thiosulfate

Tank Dimensions

Shell Height (ft):	29.80
Diameter (ft):	15.50
Liquid Height (ft) :	29.80
Avg. Liquid Height (ft):	21.00
Volume (gallons):	42,063.24
Turnovers:	17.37
Net Throughput(gal/yr):	730,789.00
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Roof Characteristics

Type:	Cone
Height (ft)	1.00
Slope (ft/ft) (Cone Roof)	0.13

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Not VOC - T-716 - Vertical Fixed Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Ammonium Thiosulfate solution	All	50.98	42.67	59.29	48.62	0.2175	0.1802	0.2673	52.3945			36.70	
Ammonium Thiosulfate						0.4000	0.4000	0.4000	148.2000	0.5800	0.7472	148.20	Option 1: VP50 = .4 VP60 = .4
Water						0.1869	0.1434	0.2451	18.0000	0.4200	0.2528	18.00	Option 1: VP50 = .18 VP60 = .25

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Not VOC - T-716 - Vertical Fixed Roof Tank
Gallup, NM

Annual Emission Calcaulations

Standing Losses (lb):	79.9452
Vapor Space Volume (cu ft):	1,723.3861
Vapor Density (lb/cu ft):	0.0021
Vapor Space Expansion Factor:	0.0676
Vented Vapor Saturation Factor:	0.9047
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	1,723.3861
Tank Diameter (ft):	15.5000
Vapor Space Outage (ft):	9.1333
Tank Shell Height (ft):	29.8000
Average Liquid Height (ft):	21.0000
Roof Outage (ft):	0.3333
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.3333
Roof Height (ft):	1.0000
Roof Slope (ft/ft):	0.1300
Shell Radius (ft):	7.7500
Vapor Density	
Vapor Density (lb/cu ft):	0.0021
Vapor Molecular Weight (lb/lb-mole):	52.3945
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.2175
Daily Avg. Liquid Surface Temp. (deg. R):	510.6529
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	508.2900
Tank Paint Solar Absorptance (Shell):	0.1700
Tank Paint Solar Absorptance (Roof):	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0676
Daily Vapor Temperature Range (deg. R):	33.2462
Daily Vapor Pressure Range (psia):	0.0871
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.2175
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.1802
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.2673
Daily Avg. Liquid Surface Temp. (deg R):	510.6529
Daily Min. Liquid Surface Temp. (deg R):	502.3414
Daily Max. Liquid Surface Temp. (deg R):	518.9645
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9047
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.2175
Vapor Space Outage (ft):	9.1333
Working Losses (lb):	198.2768
Vapor Molecular Weight (lb/lb-mole):	52.3945
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.2175
Annual Net Throughput (gal/yr.):	730,789.0000
Annual Turnovers:	17.3736
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	42,063.2416
Maximum Liquid Height (ft):	29.8000
Tank Diameter (ft):	15.5000
Working Loss Product Factor:	1.0000
Total Losses (lb):	278.2220

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

Not VOC - T-716 - Vertical Fixed Roof Tank
Gallup, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Ammonium Thiosulfate solution	198.28	79.95	278.22
Ammonium Thiosulfate	148.15	59.74	207.89
Water	50.12	20.21	70.33

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Texaco
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Horizontal Tank
Description:	Gasoline additive (TFA-4908R)

Tank Dimensions

Shell Length (ft):	17.00
Diameter (ft):	5.00
Volume (gallons):	2,000.00
Turnovers:	2.60
Net Throughput(gal/yr):	5,200.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Texaco - Horizontal Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
TEXACO Additive (System 3, TFA-4908R)	All	50.98	42.67	59.29	48.62	0.0486	0.0371	0.0631	106.0000			200.00	Option 4: RVP=.2, ASTM Slope=2.5
1,2,4-Trimethylbenzene						0.0141	0.0099	0.0199	120.1900	0.0650	0.0356	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Ethylbenzene						0.0787	0.0578	0.1059	106.1700	0.0005	0.0015	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Isopropyl benzene						0.0362	0.0259	0.0498	120.2000	0.0055	0.0077	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Unidentified Components						0.0528	0.0516	0.0516	105.4237	0.9235	0.9412	211.96	
Xylene (-m)						0.0654	0.0479	0.0882	106.1700	0.0055	0.0140	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Texaco - Horizontal Tank
Gallup, NM

Annual Emission Calcaulations

Standing Losses (lb):	4.4999
Vapor Space Volume (cu ft):	212.6078
Vapor Density (lb/cu ft):	0.0009
Vapor Space Expansion Factor:	0.0621
Vented Vapor Saturation Factor:	0.9936
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	212.6078
Tank Diameter (ft):	5.0000
Effective Diameter (ft):	10.4058
Vapor Space Outage (ft):	2.5000
Tank Shell Length (ft):	17.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0009
Vapor Molecular Weight (lb/lb-mole):	106.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0486
Daily Avg. Liquid Surface Temp. (deg. R):	510.6529
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	508.2900
Tank Paint Solar Absorptance (Shell):	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0621
Daily Vapor Temperature Range (deg. R):	33.2462
Daily Vapor Pressure Range (psia):	0.0260
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0486
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0371
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0631
Daily Avg. Liquid Surface Temp. (deg R):	510.6529
Daily Min. Liquid Surface Temp. (deg R):	502.3414
Daily Max. Liquid Surface Temp. (deg R):	518.9645
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9936
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0486
Vapor Space Outage (ft):	2.5000
Working Losses (lb):	0.6378
Vapor Molecular Weight (lb/lb-mole):	106.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0486
Annual Net Throughput (gal/yr.):	5,200.0000
Annual Turnovers:	2.6000
Turnover Factor:	1.0000
Tank Diameter (ft):	5.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	5.1377

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

Texaco - Horizontal Tank
Gallup, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
TEXACO Additive (System 3, TFA-4908R)	0.64	4.50	5.14
1,2,4-Trimethylbenzene	0.02	0.16	0.18
Isopropyl benzene	0.00	0.03	0.04
Xylene (-m)	0.01	0.06	0.07
Ethylbenzene	0.00	0.01	0.01
Unidentified Components	0.60	4.24	4.84

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Total
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Horizontal Tank
Description:	Gasoline additive

Tank Dimensions

Shell Length (ft):	21.00
Diameter (ft):	8.00
Volume (gallons):	8,000.00
Turnovers:	0.23
Net Throughput(gal/yr):	1,800.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Total - Horizontal Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
TOTAL Additive (Lubrizol 8192)	All	50.98	42.67	59.29	48.62	0.0486	0.0371	0.0631	106.0000			106.00	Option 4: RVP=.2, ASTM Slope=2.5
Ethylbenzene						0.0787	0.0578	0.1059	106.1700	0.1040	0.1685	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Unidentified Components						0.0315	-0.0210	0.0110	105.6820	0.5360	0.3473	105.85	
Xylene (-m)						0.0654	0.0479	0.0882	106.1700	0.3600	0.4842	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Total - Horizontal Tank
Gallup, NM

Annual Emission Calcaulations

Standing Losses (lb):	14.1759
Vapor Space Volume (cu ft):	672.3408
Vapor Density (lb/cu ft):	0.0009
Vapor Space Expansion Factor:	0.0621
Vented Vapor Saturation Factor:	0.9898
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	672.3408
Tank Diameter (ft):	8.0000
Effective Diameter (ft):	14.6292
Vapor Space Outage (ft):	4.0000
Tank Shell Length (ft):	21.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0009
Vapor Molecular Weight (lb/lb-mole):	106.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0486
Daily Avg. Liquid Surface Temp. (deg. R):	510.6529
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	508.2900
Tank Paint Solar Absorptance (Shell):	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0621
Daily Vapor Temperature Range (deg. R):	33.2462
Daily Vapor Pressure Range (psia):	0.0260
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0486
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0371
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0631
Daily Avg. Liquid Surface Temp. (deg R):	510.6529
Daily Min. Liquid Surface Temp. (deg R):	502.3414
Daily Max. Liquid Surface Temp. (deg R):	518.9645
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9898
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0486
Vapor Space Outage (ft):	4.0000
Working Losses (lb):	0.2208
Vapor Molecular Weight (lb/lb-mole):	106.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0486
Annual Net Throughput (gal/yr.):	1,800.0000
Annual Turnovers:	0.2250
Turnover Factor:	1.0000
Tank Diameter (ft):	8.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	14.3966

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

Total - Horizontal Tank
Gallup, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
TOTAL Additive (Lubrizol 8192)	0.22	14.18	14.40
Ethylbenzene	0.04	2.39	2.43
Xylene (-m)	0.11	6.86	6.97
Unidentified Components	0.08	4.92	5.00

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Western
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Vertical Fixed Roof Tank
Description:	Gasoline Additive

Tank Dimensions

Shell Height (ft):		17.00
Diameter (ft):		10.00
Liquid Height (ft) :		17.00
Avg. Liquid Height (ft):		6.00
Volume (gallons):		10,000.00
Turnovers:		2.60
Net Throughput(gal/yr):		26,000.00
Is Tank Heated (y/n):	N	

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Roof Characteristics

Type:	Cone	
Height (ft)		1.00
Slope (ft/ft) (Cone Roof)		0.20

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Western - Vertical Fixed Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
HiTEC 3023 Gasoline Additive	All	50.98	42.67	59.29	48.62	0.0486	0.0371	0.0631	106.0000			200.00	Option 4: RVP=.2, ASTM Slope=2.5
1,2,4-Trimethylbenzene						0.0141	0.0099	0.0199	120.1900	0.2000	0.1096	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Isopropyl benzene						0.0362	0.0259	0.0498	120.2000	0.0300	0.0421	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Unidentified Components						0.0685	0.0567	0.0616	103.5791	0.7400	0.7721	263.93	
Xylene (-m)						0.0654	0.0479	0.0882	106.1700	0.0300	0.0761	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Western - Vertical Fixed Roof Tank
Gallup, NM

Annual Emission Calcaulations

Standing Losses (lb):	18.4231
Vapor Space Volume (cu ft):	890.1179
Vapor Density (lb/cu ft):	0.0009
Vapor Space Expansion Factor:	0.0621
Vented Vapor Saturation Factor:	0.9716
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	890.1179
Tank Diameter (ft):	10.0000
Vapor Space Outage (ft):	11.3333
Tank Shell Height (ft):	17.0000
Average Liquid Height (ft):	6.0000
Roof Outage (ft):	0.3333
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.3333
Roof Height (ft):	1.0000
Roof Slope (ft/ft):	0.2000
Shell Radius (ft):	5.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0009
Vapor Molecular Weight (lb/lb-mole):	106.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0486
Daily Avg. Liquid Surface Temp. (deg. R):	510.6529
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	508.2900
Tank Paint Solar Absorptance (Shell):	0.1700
Tank Paint Solar Absorptance (Roof):	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0621
Daily Vapor Temperature Range (deg. R):	33.2462
Daily Vapor Pressure Range (psia):	0.0260
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0486
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0371
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0631
Daily Avg. Liquid Surface Temp. (deg R):	510.6529
Daily Min. Liquid Surface Temp. (deg R):	502.3414
Daily Max. Liquid Surface Temp. (deg R):	518.9645
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9716
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0486
Vapor Space Outage (ft):	11.3333
Working Losses (lb):	3.1889
Vapor Molecular Weight (lb/lb-mole):	106.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0486
Annual Net Throughput (gal/yr.):	26,000.0000
Annual Turnovers:	2.6000
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	10,000.0000
Maximum Liquid Height (ft):	17.0000
Tank Diameter (ft):	10.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	21.6120

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

Western - Vertical Fixed Roof Tank
Gallup, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
HiTEC 3023 Gasoline Additive	3.19	18.42	21.61
1,2,4-Trimethylbenzene	0.35	2.02	2.37
Isopropyl benzene	0.13	0.78	0.91
Xylene (-m)	0.24	1.40	1.65
Unidentified Components	2.46	14.22	16.69

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Z-81-T9
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Horizontal Tank
Description:	Diesel day tank

Tank Dimensions

Shell Length (ft):	12.00
Diameter (ft):	6.00
Volume (gallons):	2,500.00
Turnovers:	0.40
Net Throughput(gal/yr):	1,000.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Z-81-T9 - Horizontal Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Diesel #2 - Ciniza	All	50.98	42.67	59.29	48.62	0.0048	0.0035	0.0072	130.0000			217.00	Option 1: VP50 = .0045 VP60 = .0074
1,2,4-Trimethylbenzene						0.0141	0.0099	0.0199	120.1900	0.0039	0.0192	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane						0.4568	0.3539	0.5837	114.2300	0.0001	0.0159	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Cyclohexane						0.9439	0.7428	1.1885	84.1600	0.0004	0.1317	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0787	0.0578	0.1059	106.1700	0.0002	0.0055	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Isopropyl benzene						0.0362	0.0259	0.0498	120.2000	0.0001	0.0013	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Naphthalene						0.0016	0.0011	0.0023	128.0000	0.0018	0.0010	128.00	Option 1: VP50 = .0015 VP60 = .0024
Toluene						0.2478	0.1881	0.3230	92.1300	0.0006	0.0519	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.0030	0.0025	0.0025	152.9611	0.9908	0.7256	218.86	
Xylene (-m)						0.0654	0.0479	0.0882	106.1700	0.0021	0.0479	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Z-81-T9 - Horizontal Tank
Gallup, NM

Annual Emission Calcaulations

Standing Losses (lb):	0.5379
Vapor Space Volume (cu ft):	216.1096
Vapor Density (lb/cu ft):	0.0001
Vapor Space Expansion Factor:	0.0601
Vented Vapor Saturation Factor:	0.9992
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	216.1096
Tank Diameter (ft):	6.0000
Effective Diameter (ft):	9.5770
Vapor Space Outage (ft):	3.0000
Tank Shell Length (ft):	12.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0001
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0048
Daily Avg. Liquid Surface Temp. (deg. R):	510.6529
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	508.2900
Tank Paint Solar Absorptance (Shell):	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0601
Daily Vapor Temperature Range (deg. R):	33.2462
Daily Vapor Pressure Range (psia):	0.0037
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0048
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0035
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0072
Daily Avg. Liquid Surface Temp. (deg R):	510.6529
Daily Min. Liquid Surface Temp. (deg R):	502.3414
Daily Max. Liquid Surface Temp. (deg R):	518.9645
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9992
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0048
Vapor Space Outage (ft):	3.0000
Working Losses (lb):	0.0148
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0048
Annual Net Throughput (gal/yr.):	1,000.0000
Annual Turnovers:	0.4000
Turnover Factor:	1.0000
Tank Diameter (ft):	6.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	0.5528

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

Z-81-T9 - Horizontal Tank
Gallup, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Diesel #2 - Ciniza	0.01	0.54	0.55
Cyclohexane	0.00	0.07	0.07
2,2,4-Trimethylpentane	0.00	0.01	0.01
Toluene	0.00	0.03	0.03
Ethylbenzene	0.00	0.00	0.00
Xylene (-m)	0.00	0.03	0.03
Isopropyl benzene	0.00	0.00	0.00
1,2,4-Trimethylbenzene	0.00	0.01	0.01
Naphthalene	0.00	0.00	0.00
Unidentified Components	0.01	0.39	0.40

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Z-81-T13
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Horizontal Tank
Description:	Emerg.gen.diesel day tank

Tank Dimensions

Shell Length (ft):	5.00
Diameter (ft):	4.00
Volume (gallons):	480.00
Turnovers:	116.67
Net Throughput(gal/yr):	56,000.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	Aluminum/Specular
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Z-81-T13 - Horizontal Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Diesel #2 - Ciniza	All	54.79	43.76	65.82	49.94	0.0059	0.0036	0.0083	130.0000			217.00	Option 1: VP50 = .0045 VP60 = .0074
1,2,4-Trimethylbenzene						0.0165	0.0104	0.0257	120.1900	0.0039	0.0183	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane						0.5117	0.3662	0.7029	114.2300	0.0001	0.0145	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Cyclohexane						1.0502	0.7669	1.4154	84.1600	0.0004	0.1191	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0903	0.0602	0.1325	106.1700	0.0002	0.0051	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Isopropyl benzene						0.0419	0.0271	0.0634	120.2000	0.0001	0.0012	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Naphthalene						0.0019	0.0012	0.0032	128.0000	0.0018	0.0010	128.00	Option 1: VP50 = .0015 VP60 = .0024
Toluene						0.2801	0.1951	0.3948	92.1300	0.0006	0.0476	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.0039	0.0031	0.0031	149.8642	0.9908	0.7485	218.86	
Xylene (-m)						0.0751	0.0499	0.1106	106.1700	0.0021	0.0447	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Z-81-T13 - Horizontal Tank
Gallup, NM

Annual Emission Calcaulations

Standing Losses (lb):	0.1637
Vapor Space Volume (cu ft):	40.0203
Vapor Density (lb/cu ft):	0.0001
Vapor Space Expansion Factor:	0.0809
Vented Vapor Saturation Factor:	0.9994
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	40.0203
Tank Diameter (ft):	4.0000
Effective Diameter (ft):	5.0475
Vapor Space Outage (ft):	2.0000
Tank Shell Length (ft):	5.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0001
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0059
Daily Avg. Liquid Surface Temp. (deg. R):	514.4614
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	509.6100
Tank Paint Solar Absorptance (Shell):	0.3900
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0809
Daily Vapor Temperature Range (deg. R):	44.1247
Daily Vapor Pressure Range (psia):	0.0047
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0059
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0036
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0083
Daily Avg. Liquid Surface Temp. (deg R):	514.4614
Daily Min. Liquid Surface Temp. (deg R):	503.4303
Daily Max. Liquid Surface Temp. (deg R):	525.4926
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9994
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0059
Vapor Space Outage (ft):	2.0000
Working Losses (lb):	0.4326
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0059
Annual Net Throughput (gal/yr.):	56,000.0000
Annual Turnovers:	116.6667
Turnover Factor:	0.4238
Tank Diameter (ft):	4.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	0.5964

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

Z-81-T13 - Horizontal Tank
Gallup, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Diesel #2 - Ciniza	0.43	0.16	0.60
Cyclohexane	0.05	0.02	0.07
2,2,4-Trimethylpentane	0.01	0.00	0.01
Toluene	0.02	0.01	0.03
Ethylbenzene	0.00	0.00	0.00
Xylene (-m)	0.02	0.01	0.03
Isopropyl benzene	0.00	0.00	0.00
1,2,4-Trimethylbenzene	0.01	0.00	0.01
Naphthalene	0.00	0.00	0.00
Unidentified Components	0.32	0.12	0.45

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Z-81-T14
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Horizontal Tank
Description:	Emerg.gen.diesel day tank

Tank Dimensions

Shell Length (ft):	6.00
Diameter (ft):	4.00
Volume (gallons):	500.00
Turnovers:	14.00
Net Throughput(gal/yr):	7,000.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Z-81-T14 - Horizontal Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Diesel #2 - Ciniza	All	50.98	42.67	59.29	48.62	0.0048	0.0035	0.0072	130.0000			217.00	Option 1: VP50 = .0045 VP60 = .0074
1,2,4-Trimethylbenzene						0.0141	0.0099	0.0199	120.1900	0.0039	0.0192	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane						0.4568	0.3539	0.5837	114.2300	0.0001	0.0159	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Cyclohexane						0.9439	0.7428	1.1885	84.1600	0.0004	0.1317	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0787	0.0578	0.1059	106.1700	0.0002	0.0055	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Isopropyl benzene						0.0362	0.0259	0.0498	120.2000	0.0001	0.0013	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Naphthalene						0.0016	0.0011	0.0023	128.0000	0.0018	0.0010	128.00	Option 1: VP50 = .0015 VP60 = .0024
Toluene						0.2478	0.1881	0.3230	92.1300	0.0006	0.0519	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.0030	0.0025	0.0025	152.9611	0.9908	0.7256	218.86	
Xylene (-m)						0.0654	0.0479	0.0882	106.1700	0.0021	0.0479	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Z-81-T14 - Horizontal Tank
Gallup, NM

Annual Emission Calcaulations

Standing Losses (lb):	0.1196
Vapor Space Volume (cu ft):	48.0243
Vapor Density (lb/cu ft):	0.0001
Vapor Space Expansion Factor:	0.0601
Vented Vapor Saturation Factor:	0.9995
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	48.0243
Tank Diameter (ft):	4.0000
Effective Diameter (ft):	5.5293
Vapor Space Outage (ft):	2.0000
Tank Shell Length (ft):	6.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0001
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0048
Daily Avg. Liquid Surface Temp. (deg. R):	510.6529
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	508.2900
Tank Paint Solar Absorptance (Shell):	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0601
Daily Vapor Temperature Range (deg. R):	33.2462
Daily Vapor Pressure Range (psia):	0.0037
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0048
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0035
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0072
Daily Avg. Liquid Surface Temp. (deg R):	510.6529
Daily Min. Liquid Surface Temp. (deg R):	502.3414
Daily Max. Liquid Surface Temp. (deg R):	518.9645
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9995
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0048
Vapor Space Outage (ft):	2.0000
Working Losses (lb):	0.1037
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0048
Annual Net Throughput (gal/yr.):	7,000.0000
Annual Turnovers:	14.0000
Turnover Factor:	1.0000
Tank Diameter (ft):	4.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	0.2233

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

Z-81-T14 - Horizontal Tank
Gallup, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Diesel #2 - Ciniza	0.10	0.12	0.22
Cyclohexane	0.01	0.02	0.03
2,2,4-Trimethylpentane	0.00	0.00	0.00
Toluene	0.01	0.01	0.01
Ethylbenzene	0.00	0.00	0.00
Xylene (-m)	0.00	0.01	0.01
Isopropyl benzene	0.00	0.00	0.00
1,2,4-Trimethylbenzene	0.00	0.00	0.00
Naphthalene	0.00	0.00	0.00
Unidentified Components	0.08	0.09	0.16

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Z-81-T15
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Horizontal Tank
Description:	Emerg. air comp. diesel tank

Tank Dimensions

Shell Length (ft):	18.00
Diameter (ft):	6.00
Volume (gallons):	3,800.00
Turnovers:	14.74
Net Throughput(gal/yr):	56,000.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Z-81-T15 - Horizontal Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Diesel #2 - Ciniza	All	50.98	42.67	59.29	48.62	0.0048	0.0035	0.0072	130.0000			217.00	Option 1: VP50 = .0045 VP60 = .0074
1,2,4-Trimethylbenzene						0.0141	0.0099	0.0199	120.1900	0.0039	0.0192	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane						0.4568	0.3539	0.5837	114.2300	0.0001	0.0159	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Cyclohexane						0.9439	0.7428	1.1885	84.1600	0.0004	0.1317	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0787	0.0578	0.1059	106.1700	0.0002	0.0055	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Isopropyl benzene						0.0362	0.0259	0.0498	120.2000	0.0001	0.0013	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Naphthalene						0.0016	0.0011	0.0023	128.0000	0.0018	0.0010	128.00	Option 1: VP50 = .0015 VP60 = .0024
Toluene						0.2478	0.1881	0.3230	92.1300	0.0006	0.0519	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.0030	0.0025	0.0025	152.9611	0.9908	0.7256	218.86	
Xylene (-m)						0.0654	0.0479	0.0882	106.1700	0.0021	0.0479	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Z-81-T15 - Horizontal Tank
Gallup, NM

Annual Emission Calcaulations

Standing Losses (lb):	0.8069
Vapor Space Volume (cu ft):	324.1643
Vapor Density (lb/cu ft):	0.0001
Vapor Space Expansion Factor:	0.0601
Vented Vapor Saturation Factor:	0.9992
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	324.1643
Tank Diameter (ft):	6.0000
Effective Diameter (ft):	11.7294
Vapor Space Outage (ft):	3.0000
Tank Shell Length (ft):	18.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0001
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0048
Daily Avg. Liquid Surface Temp. (deg. R):	510.6529
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	508.2900
Tank Paint Solar Absorptance (Shell):	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0601
Daily Vapor Temperature Range (deg. R):	33.2462
Daily Vapor Pressure Range (psia):	0.0037
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0048
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0035
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0072
Daily Avg. Liquid Surface Temp. (deg R):	510.6529
Daily Min. Liquid Surface Temp. (deg R):	502.3414
Daily Max. Liquid Surface Temp. (deg R):	518.9645
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9992
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0048
Vapor Space Outage (ft):	3.0000
Working Losses (lb):	0.8294
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0048
Annual Net Throughput (gal/yr.):	56,000.0000
Annual Turnovers:	14.7368
Turnover Factor:	1.0000
Tank Diameter (ft):	6.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	1.6363

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

Z-81-T15 - Horizontal Tank
Gallup, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Diesel #2 - Ciniza	0.83	0.81	1.64
Cyclohexane	0.11	0.11	0.22
2,2,4-Trimethylpentane	0.01	0.01	0.03
Toluene	0.04	0.04	0.08
Ethylbenzene	0.00	0.00	0.01
Xylene (-m)	0.04	0.04	0.08
Isopropyl benzene	0.00	0.00	0.00
1,2,4-Trimethylbenzene	0.02	0.02	0.03
Naphthalene	0.00	0.00	0.00
Unidentified Components	0.60	0.59	1.19

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Not VOC - Z-83-T3
City:	Gallup
State:	NM
Company:	Giant Refining Company
Type of Tank:	Vertical Fixed Roof Tank
Description:	Sulfuric Acid

Tank Dimensions

Shell Height (ft):		20.00
Diameter (ft):		9.75
Liquid Height (ft) :		20.00
Avg. Liquid Height (ft):		10.00
Volume (gallons):		11,170.23
Turnovers:		0.45
Net Throughput(gal/yr):		5,018.00
Is Tank Heated (y/n):	N	

Paint Characteristics

Shell Color/Shade:	Red/Primer
Shell Condition	Poor
Roof Color/Shade:	Red/Primer
Roof Condition:	Poor

Roof Characteristics

Type:	Dome	
Height (ft)		0.50
Radius (ft) (Dome Roof)		0.00

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Not VOC - Z-83-T3 - Vertical Fixed Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Sulfuric Acid	All	63.79	46.33	81.25	53.06	0.0002	0.0002	0.0002	98.0800			98.08	Option 1: VP60 = .00019 VP70 = .00019

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Not VOC - Z-83-T3 - Vertical Fixed Roof Tank
Gallup, NM

Annual Emission Calcaulations	
Standing Losses (lb):	0.1187
Vapor Space Volume (cu ft):	765.3501
Vapor Density (lb/cu ft):	0.0000
Vapor Space Expansion Factor:	0.1281
Vented Vapor Saturation Factor:	0.9999
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	765.3501
Tank Diameter (ft):	9.7500
Vapor Space Outage (ft):	10.2509
Tank Shell Height (ft):	20.0000
Average Liquid Height (ft):	10.0000
Roof Outage (ft):	0.2509
Roof Outage (Dome Roof)	
Roof Outage (ft):	0.2509
Dome Radius (ft):	0.0000
Shell Radius (ft):	4.8750
Vapor Density	
Vapor Density (lb/cu ft):	0.0000
Vapor Molecular Weight (lb/lb-mole):	98.0800
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0002
Daily Avg. Liquid Surface Temp. (deg. R):	523.4634
Daily Average Ambient Temp. (deg. F):	48.6000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	512.7300
Tank Paint Solar Absorptance (Shell):	0.9100
Tank Paint Solar Absorptance (Roof):	0.9100
Daily Total Solar Insulation Factor (Btu/sqft day):	1,766.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.1281
Daily Vapor Temperature Range (deg. R):	69.8377
Daily Vapor Pressure Range (psia):	0.0000
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0002
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0002
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0002
Daily Avg. Liquid Surface Temp. (deg R):	523.4634
Daily Min. Liquid Surface Temp. (deg R):	506.0040
Daily Max. Liquid Surface Temp. (deg R):	540.9228
Daily Ambient Temp. Range (deg. R):	34.5000
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9999
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0002
Vapor Space Outage (ft):	10.2509
Working Losses (lb):	0.0022
Vapor Molecular Weight (lb/lb-mole):	98.0800
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0002
Annual Net Throughput (gal/yr.):	5,018.0000
Annual Turnovers:	0.4492
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	11,170.2349
Maximum Liquid Height (ft):	20.0000
Tank Diameter (ft):	9.7500
Working Loss Product Factor:	1.0000
Total Losses (lb):	0.1209

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

Not VOC - Z-83-T3 - Vertical Fixed Roof Tank
Gallup, NM

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Sulfuric Acid	0.00	0.12	0.12

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Z-84-T1
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Internal Floating Roof Tank
Description:	Wastewater tank

Tank Dimensions

Diameter (ft):	39.00
Volume (gallons):	210,000.00
Turnovers:	3.33
Self Supp. Roof? (y/n):	N
No. of Columns:	1.00
Eff. Col. Diam. (ft):	0.80

Paint Characteristics

Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Rim-Seal System

Primary Seal:	Vapor-mounted
Secondary Seal	Rim-mounted

Deck Characteristics

Deck Fitting Category:	Detail
Deck Type:	Welded

Deck Fitting/Status	Quantity
Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed	1
Automatic Gauge Float Well/Unbolted Cover, Ungasketed	1
Column Well (24-in. Diam.)/Built-Up Col.-Sliding Cover, Ungask.	1
Ladder Well (36-in. Diam.)/Sliding Cover, Ungasketed	1
Roof Leg or Hanger Well/Adjustable	12
Sample Pipe or Well (24-in. Diam.)/Slit Fabric Seal 10% Open	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Z-84-T1 - Internal Floating Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Recovered Oil - Ciniza	All	50.98	42.67	59.29	48.62	0.7487	N/A	N/A	91.6506			105.41	Option 1: VP50 = .6 VP60 = .8
1,2,4-Trimethylbenzene						0.0141	N/A	N/A	120.1900	0.0114	0.0002	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane						0.4568	N/A	N/A	114.2300	0.0064	0.0045	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
2-Methyl-1-butene						3.6877	N/A	N/A	70.1300	0.0016	0.0091	70.13	Option 2: A=6.4863, B=1039.69, C=236.65
Benzene						0.9046	N/A	N/A	78.1100	0.0057	0.0079	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.9439	N/A	N/A	84.1600	0.0066	0.0096	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0787	N/A	N/A	106.1700	0.0051	0.0006	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.5057	N/A	N/A	86.1700	0.0100	0.0231	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopentane						8.0970	N/A	N/A	72.1500	0.0195	0.2425	72.15	Option 1: VP50 = 7.889 VP60 = 10.005
Isopropyl benzene						0.0362	N/A	N/A	120.2000	0.0006	0.0000	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Naphtha						0.4566	N/A	N/A	108.0000	0.8695	0.6099	108.00	Option 4: RVP=1.5, ASTM Slope=1.5
Naphthalene						0.0016	N/A	N/A	128.0000	0.0024	0.0000	128.00	Option 1: VP50 = .0015 VP60 = .0024
Pentane (-n)						5.5760	N/A	N/A	72.1500	0.0094	0.0805	72.15	Option 3: A=27691, B=7.558
Toluene						0.2478	N/A	N/A	92.1300	0.0242	0.0092	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Xylene (-m)						0.0654	N/A	N/A	106.1700	0.0276	0.0028	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Z-84-T1 - Internal Floating Roof Tank
Gallup, NM

Annual Emission Calcaulations

Rim Seal Losses (lb):	53.9022
Seal Factor A (lb-mole/ft-yr):	2.2000
Seal Factor B (lb-mole/ft-yr (mph)^n):	0.0030
Value of Vapor Pressure Function:	0.0171
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.7487
Tank Diameter (ft):	39.0000
Vapor Molecular Weight (lb/lb-mole):	91.6506
Product Factor:	0.4000
Withdrawal Losses (lb):	15.5829
Number of Columns:	1.0000
Effective Column Diameter (ft):	0.8000
Annual Net Throughput (gal/yr.):	700,000.0000
Shell Clingage Factor (bbl/1000 sqft):	0.0060
Average Organic Liquid Density (lb/gal):	6.3151
Tank Diameter (ft):	39.0000
Deck Fitting Losses (lb):	179.6739
Value of Vapor Pressure Function:	0.0171
Vapor Molecular Weight (lb/lb-mole):	91.6506
Product Factor:	0.4000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	286.0000
Deck Seam Losses (lb):	0.0000
Deck Seam Length (ft):	0.0000
Deck Seam Loss per Unit Length Factor (lb-mole/ft-yr):	0.0000
Deck Seam Length Factor(ft/sqft):	0.0000
Tank Diameter (ft):	39.0000
Vapor Molecular Weight (lb/lb-mole):	91.6506
Product Factor:	0.4000
Total Losses (lb):	249.1589

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors KFa(lb-mole/yr)	KFb(lb-mole/(yr mph^n))	m	Losses(lb)
Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed	1	36.00	5.90	1.20	22.6163
Automatic Gauge Float Well/Unbolted Cover, Ungasketed	1	14.00	5.40	1.10	8.7952
Column Well (24-in. Diam.)/Built-Up Col.-Sliding Cover, Ungask.	1	47.00	0.00	0.00	29.5268
Ladder Well (36-in. Diam.)/Sliding Cover, Ungasketed	1	76.00	0.00	0.00	47.7455
Roof Leg or Hanger Well/Adjustable	12	7.90	0.00	0.00	59.5562
Sample Pipe or Well (24-in. Diam.)/Slit Fabric Seal 10% Open	1	12.00	0.00	0.00	7.5388
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	3.8950

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

Z-84-T1 - Internal Floating Roof Tank
Gallup, NM

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Recovered Oil - Ciniza	53.90	15.58	179.67	0.00	249.16
Isopentane	13.07	0.30	43.58	0.00	56.96
2-Methyl-1-butene	0.49	0.02	1.63	0.00	2.14
Pentane (-n)	4.34	0.15	14.47	0.00	18.95
Hexane (-n)	1.25	0.16	4.16	0.00	5.56
Benzene	0.43	0.09	1.42	0.00	1.94
Cyclohexane	0.52	0.10	1.72	0.00	2.34
2,2,4-Trimethylpentane	0.24	0.10	0.81	0.00	1.15
Toluene	0.50	0.38	1.66	0.00	2.53
Ethylbenzene	0.03	0.08	0.11	0.00	0.22
Xylene (-m)	0.15	0.43	0.50	0.00	1.08
1,2,4-Trimethylbenzene	0.01	0.18	0.04	0.00	0.24
Naphthalene	0.00	0.04	0.00	0.00	0.04
Isopropyl benzene	0.00	0.01	0.01	0.00	0.02
Naphtha	32.87	13.55	109.58	0.00	156.00

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Z-84-T2
City:	Gallup
State:	NM
Company:	Western Refining Southwest, Inc.
Type of Tank:	Internal Floating Roof Tank
Description:	Wastewater tank

Tank Dimensions

Diameter (ft):	39.00
Volume (gallons):	210,000.00
Turnovers:	3.33
Self Supp. Roof? (y/n):	N
No. of Columns:	1.00
Eff. Col. Diam. (ft):	0.80

Paint Characteristics

Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Rim-Seal System

Primary Seal:	Vapor-mounted
Secondary Seal	Rim-mounted

Deck Characteristics

Deck Fitting Category:	Detail
Deck Type:	Welded

Deck Fitting/Status	Quantity
Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed	1
Automatic Gauge Float Well/Unbolted Cover, Ungasketed	1
Column Well (24-in. Diam.)/Built-Up Col.-Sliding Cover, Ungask.	1
Ladder Well (36-in. Diam.)/Sliding Cover, Ungasketed	1
Roof Leg or Hanger Well/Adjustable	12
Sample Pipe or Well (24-in. Diam.)/Slit Fabric Seal 10% Open	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1

Meterological Data used in Emissions Calculations: Gallup, New Mexico (Avg Atmospheric Pressure = 11.3 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Z-84-T2 - Internal Floating Roof Tank
Gallup, NM

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Recovered Oil - Ciniza	All	50.98	42.67	59.29	48.62	0.7487	N/A	N/A	91.6506			105.41	Option 1: VP50 = .6 VP60 = .8
1,2,4-Trimethylbenzene						0.0141	N/A	N/A	120.1900	0.0114	0.0002	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane						0.4568	N/A	N/A	114.2300	0.0064	0.0045	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
2-Methyl-1-butene						3.6877	N/A	N/A	70.1300	0.0016	0.0091	70.13	Option 2: A=6.4863, B=1039.69, C=236.65
Benzene						0.9046	N/A	N/A	78.1100	0.0057	0.0079	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.9439	N/A	N/A	84.1600	0.0066	0.0096	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0787	N/A	N/A	106.1700	0.0051	0.0006	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.5057	N/A	N/A	86.1700	0.0100	0.0231	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopentane						8.0970	N/A	N/A	72.1500	0.0195	0.2425	72.15	Option 1: VP50 = 7.889 VP60 = 10.005
Isopropyl benzene						0.0362	N/A	N/A	120.2000	0.0006	0.0000	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Naphtha						0.4566	N/A	N/A	108.0000	0.8695	0.6099	108.00	Option 4: RVP=1.5, ASTM Slope=1.5
Naphthalene						0.0016	N/A	N/A	128.0000	0.0024	0.0000	128.00	Option 1: VP50 = .0015 VP60 = .0024
Pentane (-n)						5.5760	N/A	N/A	72.1500	0.0094	0.0805	72.15	Option 3: A=27691, B=7.558
Toluene						0.2478	N/A	N/A	92.1300	0.0242	0.0092	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Xylene (-m)						0.0654	N/A	N/A	106.1700	0.0276	0.0028	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Z-84-T2 - Internal Floating Roof Tank
Gallup, NM

Annual Emission Calcaulations	
Rim Seal Losses (lb):	53.9022
Seal Factor A (lb-mole/ft-yr):	2.2000
Seal Factor B (lb-mole/ft-yr (mph)^n):	0.0030
Value of Vapor Pressure Function:	0.0171
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.7487
Tank Diameter (ft):	39.0000
Vapor Molecular Weight (lb/lb-mole):	91.6506
Product Factor:	0.4000
Withdrawal Losses (lb):	15.5829
Number of Columns:	1.0000
Effective Column Diameter (ft):	0.8000
Annual Net Throughput (gal/yr.):	700,000.0000
Shell Clingage Factor (bbl/1000 sqft):	0.0060
Average Organic Liquid Density (lb/gal):	6.3151
Tank Diameter (ft):	39.0000
Deck Fitting Losses (lb):	179.6739
Value of Vapor Pressure Function:	0.0171
Vapor Molecular Weight (lb/lb-mole):	91.6506
Product Factor:	0.4000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	286.0000
Deck Seam Losses (lb):	0.0000
Deck Seam Length (ft):	0.0000
Deck Seam Loss per Unit Length Factor (lb-mole/ft-yr):	0.0000
Deck Seam Length Factor(ft/sqft):	0.0000
Tank Diameter (ft):	39.0000
Vapor Molecular Weight (lb/lb-mole):	91.6506
Product Factor:	0.4000
Total Losses (lb):	249.1589

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors KFa(lb-mole/yr)	KFb(lb-mole/(yr mph^n))	m	Losses(lb)
Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed	1	36.00	5.90	1.20	22.6163
Automatic Gauge Float Well/Unbolted Cover, Ungasketed	1	14.00	5.40	1.10	8.7952
Column Well (24-in. Diam.)/Built-Up Col.-Sliding Cover, Ungask.	1	47.00	0.00	0.00	29.5268
Ladder Well (36-in. Diam.)/Sliding Cover, Ungasketed	1	76.00	0.00	0.00	47.7455
Roof Leg or Hanger Well/Adjustable	12	7.90	0.00	0.00	59.5562
Sample Pipe or Well (24-in. Diam.)/Slit Fabric Seal 10% Open	1	12.00	0.00	0.00	7.5388
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	3.8950

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

Z-84-T2 - Internal Floating Roof Tank
Gallup, NM

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Recovered Oil - Ciniza	53.90	15.58	179.67	0.00	249.16
Isopentane	13.07	0.30	43.58	0.00	56.96
2-Methyl-1-butene	0.49	0.02	1.63	0.00	2.14
Pentane (-n)	4.34	0.15	14.47	0.00	18.95
Hexane (-n)	1.25	0.16	4.16	0.00	5.56
Benzene	0.43	0.09	1.42	0.00	1.94
Cyclohexane	0.52	0.10	1.72	0.00	2.34
2,2,4-Trimethylpentane	0.24	0.10	0.81	0.00	1.15
Toluene	0.50	0.38	1.66	0.00	2.53
Ethylbenzene	0.03	0.08	0.11	0.00	0.22
Xylene (-m)	0.15	0.43	0.50	0.00	1.08
1,2,4-Trimethylbenzene	0.01	0.18	0.04	0.00	0.24
Naphthalene	0.00	0.04	0.00	0.00	0.04
Isopropyl benzene	0.00	0.01	0.01	0.00	0.02
Naphtha	32.87	13.55	109.58	0.00	156.00

Vacuum Truck Loading Emissions [1, 2, 3, 4, 5, 6, 7]

	Loading Diesel	Loading Gasoline	Total
Saturation Factor (S)	1.45	1.45	
True Vapor Pressure of Liquid (psia)	0.0090	9.24	
Molecular Weight (lb/lb-mole)	130	61	
Temperature (°F)	70	70	
Loading Loss L_L (lb per 1000 gallons)	0.040	19	
Truck Capacity (Gallons)	-	-	3000
Max Hourly Emissions (lb/hr)	**0.24**	**1.15**	**1.15**
Annual Emissions (tons/yr)	**0.13**	**0.63**	**0.76**

[1] For the calculation of maximum hourly emissions when loading gasoline, it is assumed that only 1% of the liquid loaded is gasoline and the rest is the liquid with minimal VOC content. The maximum hourly emissions is the larger emission from either loading diesel or loading gasoline mixture.
The annual emissions are calculated assuming 99% of the liquid loaded in vacuum trucks per year is diesel, and 1% of the liquid loaded is gasoline.

[2] Loading loss calculation is based on U.S. EPA AP-42, Section 5.2 (Transportation and Marketing of Petroleum Liquid), January 1995, Equation 1.

[3] Saturation factor is conservatively assumed to be the factor for Splash Loading: Dedicated Normal Service from Table 5.2-1.

[4] Properties of Distillate Fuel Oil No. 2 obtained from U.S. AP-42, Section 7.1 (Organic Liquid Storage Tanks), Table 7.1-2, September 1997.
Gasoline products at Western include RVP9, RVP12, and RVP14. For conservertive purposes, it is assumed RVP14 is loaded into vacuum truck.
Properties of gasoline RVP14 are estimated by averaging the property of RVP15 and RVP13.5 from U.S. AP-42, Section 7.1, Table 7.1-2, September 1997.

[5] Calculation conservatively assumes that the entire vacuum truck volume can be loaded in one hour.

[6] Calculation conservatively assumes that all three trucks maintained on-site are filled once per day, for 365 days per year.

[7] The following safety factor is added in the calculation: 2

Vacuum Truck Cleaning Emissions [1, 2]

Vapor Pressure of Diesel at 100^0 F (Psia)	0.022
Vapor Pressure of Diesel at 70^0 F (Psia)	0.009
Molecular Weight of Diesel (lb/lb-mole)	130
Volume of Truck (Gallons)	3,000
Max Number of Trucks Cleaned Per Hour	1
Number of Trucks Cleaned Per Year	1095
Max Hourly Emissions (lb/hr)	0.38
Annual Emissions (tpy)	0.09

[1] Properties of Distillate Fuel Oil No. 2 obtained from U.S. AP-42, Section 7.1 (Organic Liquid Storage Tanks), Table 7.1-2, September 1997.

[2] The following safety factor is added in the calculation: 2

Short-Term Hourly Process Vessel Cleaning Emissions [1]

Process Unit Name	Chemical Used for Cleaning	Quantity Used (gal)	Density (lb/gal)	VOC Content (wt. %)	VOC Released during Cleaning (%)	Cleaning Time (hrs)	VOC Emissions from Cleaning (lb/hr)	Number of Baker Tanks	Baker Tank Standing Losses (lb)	Baker Tank Working Losses (lb)	VOC Emissions from Baker Tanks (lb/hr)	Number of Vacuum Trucks	Max. No. of Vac. Trucks Cleaned per Hour	VOC Emissions from Vacuum Truck Loading (lb/hr)	VOC Emissions from Vacuum Truck Cleaning (lb/hr)	VOC (lb/hr)
Crude Unit	Crude Unit	4000	7.70	60	5	12	77.00	1	3.12	1.27	1.28	1	1	1.15	0.38	79.81
Platformer	General Worst Case	4000	8.66	91	5	10	157.61	1	3.12	1.27	1.28	1	1	1.15	0.38	160.42
Naphtha Hydrotreater	General Worst Case	4000	8.66	91	5	10	157.61	1	3.12	1.27	1.28	1	1	1.15	0.38	160.42
BENSAT (Naphtha splitter)	General Worst Case	4000	8.66	91	5	15	105.07	1	3.12	1.27	1.28	1	1	1.15	0.38	107.88
FCCU and CO Boiler	General Worst Case	4000	8.66	91	5	10	157.61	1	3.12	1.27	1.28	1	1	1.15	0.38	160.42
Gas Con Unit	General Worst Case	4000	8.66	91	5	15	105.07	1	3.12	1.27	1.28	1	1	1.15	0.38	107.88
Hydrofluoric Alkylation Unit	Alky	4000	8.66	91	5	10	157.61	1	3.12	1.27	1.28	1	1	1.15	0.38	160.42
Isomerization Unit	General Worst Case	4000	8.66	91	5	12	131.34	1	3.12	1.27	1.28	1	1	1.15	0.38	134.15
Kerosene Hydrotreater	General Worst Case	4000	8.66	91	5	10	157.61	1	3.12	1.27	1.28	1	1	1.15	0.38	160.42
Distillate Hydrotreater	General Worst Case	4000	8.66	91	5	10	157.61	1	3.12	1.27	1.28	1	1	1.15	0.38	160.42
Saturated Gas Unit	General Worst Case	4000	8.66	91	5	10	157.61	1	3.12	1.27	1.28	1	1	1.15	0.38	160.42
Wastewater Treatment (MPPE)	General Worst Case	4000	8.66	91	5	10	157.61	1	3.12	1.27	1.28	1	1	1.15	0.38	160.42
Bullet tanks	General Worst Case	4000	8.66	91	5	10	157.61	1	3.12	1.27	1.28	1	1	1.15	0.38	160.42
Sour Water Stripper	SRU	4000	7.86	60	5	15	62.88	1	3.12	1.27	1.28	1	1	1.15	0.38	65.69
Amine Unit	SRU	4000	7.86	60	5	15	62.88	1	3.12	1.27	1.28	1	1	1.15	0.38	65.69
Thiosolv Unit (SWAATS)	SRU	4000	7.86	60	5	15	62.88	1	3.12	1.27	1.28	1	1	1.15	0.38	65.69
Sulferox SRU	SRU	4000	7.86	60	5	15	62.88	1	3.12	1.27	1.28	1	1	1.15	0.38	65.69
Flare System	General Worst Case	4000	8.66	91	5	10	157.61	1	3.12	1.27	1.28	1	1	1.15	0.38	160.42
Emergency Ground Flare	Alky	4000	8.66	91	5	15	105.07	1	3.12	1.27	1.28	1	1	1.15	0.38	107.88
Treating Units (Merox, etc)	General Worst Case	4000	8.66	91	5	10	157.61	1	3.12	1.27	1.28	1	1	1.15	0.38	160.42
HC Blowdown Drum	General Worst Case	4000	8.66	91	5	10	157.61	1	3.12	1.27	1.28	1	1	1.15	0.38	160.42

1 Standing losses and working losses from Baker tanks are calculated using U.S. EPA TANKS 4.09d, assuming 1 turnover. Baker tanks are used to store wash water that has been used to clean process vessels or tanks on-site.

Since the exact composition of the wash water is unknown, it is conservatively assumed that the tanks are filled with a product that has the same properties as diesel.

Annual Process Vessel Cleaning Emissions [1, 2]

Plant Name	Chemical Used for Cleaning	Quantity Used (gal)	Density (lb/gal)	VOC Content (wt. %)	VOC Released during Cleaning (%)	VOC Emissions from Cleaning	Number of Baker Tanks	Baker Tank Standing Losses (lb)	Baker Tank Working Losses (lb)	VOC Emissions from Baker Tanks (tpy)	Number of Vacuum Truck	Max. No. of Vac. Truck Cleaned per Year	VOC Emissions from Vacuum Truck Loading (tpy)	VOC Emissions from Vacuum Truck Cleaning (tpy)	VOC (tpy)
Crude Unit	Crude Unit	4000	7.70	60	5	0.46	1	3.12	1.27	0.0022	1	17	0.036	0.004	0.50
Platformer	General Worst Case	4000	8.66	91	5	0.79	1	3.12	1.27	0.0022	1	17	0.036	0.004	0.83
Naphtha Hydrotreater	General Worst Case	4000	8.66	91	5	0.79	1	3.12	1.27	0.0022	1	17	0.036	0.004	0.83
BENSAT (Naphtha splitter)	General Worst Case	4000	8.66	91	5	0.79	1	3.12	1.27	0.0022	1	17	0.036	0.004	0.83
FCCU and CO Boiler	General Worst Case	4000	8.66	91	5	0.79	1	3.12	1.27	0.0022	1	17	0.036	0.004	0.83
Gas Con Unit	General Worst Case	4000	8.66	91	5	0.79	1	3.12	1.27	0.0022	1	17	0.036	0.004	0.83
Hydrofluoric Alkylation Unit	Alky	4000	8.66	91	5	0.79	1	3.12	1.27	0.0022	1	17	0.036	0.004	0.83
Isomerization Unit	General Worst Case	4000	8.66	91	5	0.79	1	3.12	1.27	0.0022	1	17	0.036	0.004	0.83
Kerosene Hydrotreater	General Worst Case	4000	8.66	91	5	0.79	1	3.12	1.27	0.0022	1	17	0.036	0.004	0.83
Distillate Hydrotreater	General Worst Case	4000	8.66	91	5	0.79	1	3.12	1.27	0.0022	1	17	0.036	0.004	0.83
Saturated Gas Unit	General Worst Case	4000	8.66	91	5	0.79	1	3.12	1.27	0.0022	1	17	0.036	0.004	0.83
Crude Unit	General Worst Case	4000	8.66	91	5	0.79	1	3.12	1.27	0.0022	1	17	0.036	0.004	0.83
Bullet tanks	General Worst Case	4000	8.66	91	5	0.79	1	3.12	1.27	0.0022	1	17	0.036	0.004	0.83
Sour Water Stripper	SRU	4000	7.86	60	5	0.47	1	3.12	1.27	0.0022	1	17	0.036	0.004	0.51
Amine Unit	SRU	4000	7.86	60	5	0.47	1	3.12	1.27	0.0022	1	17	0.036	0.004	0.51
Thiosolv Unit (SWAATS)	SRU	4000	7.86	60	5	0.47	1	3.12	1.27	0.0022	1	17	0.036	0.004	0.51
Sulferox SRU	SRU	4000	7.86	60	5	0.47	1	3.12	1.27	0.0022	1	17	0.036	0.004	0.51
Flare System	General Worst Case	4000	8.66	91	5	0.79	1	3.12	1.27	0.0022	1	17	0.036	0.004	0.83
Emergency Ground Flare	Alky	4000	8.66	91	5	0.79	1	3.12	1.27	0.0022	1	17	0.036	0.004	0.83
Treating Units (Merox, etc)	General Worst Case	4000	8.66	91	5	0.79	1	3.12	1.27	0.0022	1	17	0.036	0.004	0.83
HC Blowdown Drum	General Worst Case	4000	8.66	91	5	0.79	1	3.12	1.27	0.0022	1	17	0.036	0.004	0.83

1 Vacuum truck emissions are obtained from Tables E-5 and E-6.

2 Standing losses and working losses from Baker tanks are calculated using U.S. EPA TANKS 4.09d, assuming 1 turnover. Baker tanks are used to store wash water that has been used to clean process vessels or tanks on-site.

Since the exact composition of the wash water is unknown, it is conservatively assumed that the tanks are filled with a product that has the same properties as diesel.

FCCU Bypass (SSM)
Stack Test Condition 1 ESP Collection Efficiency Calculations

Particle Size (µm)	$PM_{2.5}$					PM_{10}																
	0-0.5	0.5-1	1-1.5	1.5-2.0	2.0-2.5	2.5-3.0	3.0-3.5	3.5-4.0	4.0-4.5	4.5-5.0	5.0-5.5	5.5-6.0	6.0-6.5	6.5-7.0	7.0-7.5	7.5-8.0	8.0-8.5	8.5-9.0	9.0-9.5	9.5-10		
ESP Collection Efficiency (%)	80.26 %					98.84 %															%	Collection Efficiency
$\eta = 1 - \exp(-w_e A/Q)$	84.75	64.13	76.89	85.11	90.41	93.82	96.02	97.44	98.35	98.94	99.31	99.56	99.72	99.82	99.88	99.92	99.95	99.97	99.98	99.99	%	Collection Efficiency
w_e	1.58E-02	8.60E-03	1.23E-02	1.60E-02	1.97E-02	2.34E-02	2.71E-02	3.07E-02	3.44E-02	3.81E-02	4.18E-02	4.55E-02	4.92E-02	5.29E-02	5.66E-02	6.03E-02	6.40E-02	6.76E-02	7.13E-02	7.50E-02	m/sec	Particle Drift Speed
A	4,688	4,688	4,688	4,688	4,688	4,688	4,688	4,688	4,688	4,688	4,688	4,688	4,688	4,688	4,688	4,688	4,688	4,688	4,688	4,688	m^2	Collection Area
Q	39.34	39.34	39.34	39.34	39.34	39.34	39.34	39.34	39.34	39.34	39.34	39.34	39.34	39.34	39.34	39.34	39.34	39.34	39.34	39.34	m^3/sec	Airflow
Cunningham Slip Factor	$C_c = 1 + \lambda_g / d_p [2.51 + 0.80 \exp(-0.55 d_p/\lambda_g)]$																					
C_c	1.33	1.17	1.11	1.08	1.07	1.06	1.05	1.04	1.04	1.03	1.03	1.03	1.03	1.02	1.02	1.02	1.02	1.02	1.02	1.02		Cunningham Slip Factor
λ_g	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	µm	Mean Free Path Length for Air at 68F and 1 atm.
d_p	0.50	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50	8.00	8.50	9.00	9.50	10.00	µm	Particle Diameter
Drift speed (0.5-10 µm)	$w_e = qEC_c/3\pi\mu d_p$																					
w_e	1.58E-02	8.60E-03	1.23E-02	1.60E-02	1.97E-02	2.34E-02	2.71E-02	3.07E-02	3.44E-02	3.81E-02	4.18E-02	4.55E-02	4.92E-02	5.29E-02	5.66E-02	6.03E-02	6.40E-02	6.76E-02	7.13E-02	7.50E-02	m/sec	Particle Drift Speed
q	1.16E-17	1.45E-17	3.26E-17	5.80E-17	9.06E-17	1.30E-16	1.78E-16	2.32E-16	2.93E-16	3.62E-16	4.38E-16	5.22E-16	6.12E-16	7.10E-16	8.15E-16	9.27E-16	1.05E-15	1.17E-15	1.31E-15	1.45E-15	C	Charge acquired by each particle
E	86,832	86,832	86,832	86,832	86,832	86,832	86,832	86,832	86,832	86,832	86,832	86,832	86,832	86,832	86,832	86,832	86,832	86,832	86,832	86,832	V/m	Electrical field= voltage difference divided by electrode-plate distance
C_c	1.33	1.17	1.11	1.08	1.07	1.06	1.05	1.04	1.04	1.03	1.03	1.03	1.03	1.02	1.02	1.02	1.02	1.02	1.02	1.02		Cunningham slip factor
μ	1.81E-05	1.81E-05	1.81E-05	1.81E-05	1.81E-05	1.81E-05	1.81E-05	1.81E-05	1.81E-05	1.81E-05	1.81E-05	1.81E-05	1.81E-05	1.81E-05	1.81E-05	1.81E-05	1.81E-05	1.81E-05	1.81E-05	1.81E-05	kg/ms	Fluid Viscosity for Air at Ambient Temperature
d_p	5.00E-07	1.00E-06	1.50E-06	2.00E-06	2.50E-06	3.00E-06	3.50E-06	4.00E-06	4.50E-06	5.00E-06	5.50E-06	6.00E-06	6.50E-06	7.00E-06	7.50E-06	8.00E-06	8.50E-06	9.00E-06	9.50E-06	1.00E-05	m	particle diameter
Max Diffusion Particle Charge (0-0.5 µm)	$q_{max} = 10^8 e d_p$																					
q_{max}	8.00E-18	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	m/sec	Particle Drift Speed
e	1.60E-19	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	C	Elementary Charge of Electron
d_p	5.00E-07	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	m	Particle Diameter
Max Field Particle Charge (0.2-10 µm)	$q_{max} = 4\pi\varepsilon_0 E_0 d^2_p (3\varepsilon_r/\varepsilon_r+2)$																					
q_{max}	3.62E-18	1.45E-17	3.26E-17	5.80E-17	9.06E-17	1.30E-16	1.78E-16	2.32E-16	2.93E-16	3.62E-16	4.38E-16	5.22E-16	6.12E-16	7.10E-16	8.15E-16	9.27E-16	1.05E-15	1.17E-15	1.31E-15	1.45E-15	C	Coulombs
ε_0	8.85E-12	8.85E-12	8.85E-12	8.85E-12	8.85E-12	8.85E-12	8.85E-12	8.85E-12	8.85E-12	8.85E-12	8.85E-12	8.85E-12	8.85E-12	8.85E-12	8.85E-12	8.85E-12	8.85E-12	8.85E-12	8.85E-12	8.85E-12	C/Vm	Permittivity of Vacuum
E_0	86,832	86,832	86,832	86,832	86,832	86,832	86,832	86,832	86,832	86,832	86,832	86,832	86,832	86,832	86,832	86,832	86,832	86,832	86,832	86,832	V/m	Charging Field Strength
d_p	5.00E-07	1.00E-06	1.50E-06	2.00E-06	2.50E-06	3.00E-06	3.50E-06	4.00E-06	4.50E-06	5.00E-06	5.50E-06	6.00E-06	6.50E-06	7.00E-06	7.50E-06	8.00E-06	8.50E-06	9.00E-06	9.50E-06	1.00E-05	m	Particle Diameter
ε_r	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		Dielectric Constant (approximately 1.5-2.6 for fly ash)

FCCU Bypass (SSM)
Stack Test Condition 2 ESP Collection Efficiency Calculations

Particle Size (µm)	$PM_{2.5}$					PM_{10}																
	0-0.5	**0.5-1**	**1-1.5**	**1.5-2.0**	**2.0-2.5**	**2.5-3.0**	**3.0-3.5**	**3.5-4.0**	**4.0-4.5**	**4.5-5.0**	**5.0-5.5**	**5.5-6.0**	**6.0-6.5**	**6.5-7.0**	**7.0-7.5**	**7.5-8.0**	**8.0-8.5**	**8.5-9.0**	**9.0-9.5**	**9.5-10**		
ESP Collection Efficiency (%)	81.07 %					98.95 %															%	Collection Efficiency
$\eta = 1 - \exp(-w_e A/Q)$	85.52	65.13	77.81	85.88	91.01	94.28	96.36	97.68	98.53	99.06	99.40	99.62	99.76	99.85	99.90	99.94	99.96	99.97	99.98	99.99	%	Collection Efficiency
w_e	1.62E-02	8.84E-03	1.26E-02	1.64E-02	2.02E-02	2.40E-02	2.78E-02	3.16E-02	3.54E-02	3.92E-02	4.30E-02	4.68E-02	5.05E-02	5.43E-02	5.81E-02	6.19E-02	6.57E-02	6.95E-02	7.33E-02	7.71E-02	m/sec	Particle Drift Speed
A	4,688	4,688	4,688	4,688	4,688	4,688	4,688	4,688	4,688	4,688	4,688	4,688	4,688	4,688	4,688	4,688	4,688	4,688	4,688	4,688	m^2	Collection Area
Q	39.34	39.34	39.34	39.34	39.34	39.34	39.34	39.34	39.34	39.34	39.34	39.34	39.34	39.34	39.34	39.34	39.34	39.34	39.34	39.34	m^3/sec	Airflow
Cunningham Slip Factor	$C_c = 1 + \lambda_g / d_p[2.51+0.80 \exp(-0.55 d_p/\lambda_g)]$																					
C_c	1.33	1.17	1.11	1.08	1.07	1.06	1.05	1.04	1.04	1.03	1.03	1.03	1.03	1.02	1.02	1.02	1.02	1.02	1.02	1.02		Cunningham Slip Factor
λ_g	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	µm	Mean Free Path Length for Air at 68F and 1 atm.
d_p	0.50	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50	8.00	8.50	9.00	9.50	10.00	µm	Particle Diameter
Drift speed (0.5-10 µm)	$w_e = qEC_c/3\pi\mu d_p$																					
w_e	1.62E-02	8.84E-03	1.26E-02	1.64E-02	2.02E-02	2.40E-02	2.78E-02	3.16E-02	3.54E-02	3.92E-02	4.30E-02	4.68E-02	5.05E-02	5.43E-02	5.81E-02	6.19E-02	6.57E-02	6.95E-02	7.33E-02	7.71E-02	m/sec	Particle Drift Speed
q	1.16E-17	1.45E-17	3.26E-17	5.80E-17	9.06E-17	1.30E-16	1.78E-16	2.32E-16	2.93E-16	3.62E-16	4.38E-16	5.22E-16	6.12E-16	7.10E-16	8.15E-16	9.27E-16	1.05E-15	1.17E-15	1.31E-15	1.45E-15	C	Charge acquired by each particle
E	89,224	89,224	89,224	89,224	89,224	89,224	89,224	89,224	89,224	89,224	89,224	89,224	89,224	89,224	89,224	89,224	89,224	89,224	89,224	89,224	V/m	Electrical field= voltage difference divided by electrode-plate distance
C_c	1.33	1.17	1.11	1.08	1.07	1.06	1.05	1.04	1.04	1.03	1.03	1.03	1.03	1.02	1.02	1.02	1.02	1.02	1.02	1.02		Cunningham slip factor
μ	1.81E-05	1.81E-05	1.81E-05	1.81E-05	1.81E-05	1.81E-05	1.81E-05	1.81E-05	1.81E-05	1.81E-05	1.81E-05	1.81E-05	1.81E-05	1.81E-05	1.81E-05	1.81E-05	1.81E-05	1.81E-05	1.81E-05	1.81E-05	kg/ms	Fluid Viscosity for Air at Ambient Temperature
d_p	5.00E-07	1.00E-06	1.50E-06	2.00E-06	2.50E-06	3.00E-06	3.50E-06	4.00E-06	4.50E-06	5.00E-06	5.50E-06	6.00E-06	6.50E-06	7.00E-06	7.50E-06	8.00E-06	8.50E-06	9.00E-06	9.50E-06	1.00E-05	m	particle diameter
Max Diffusion Particle Charge (0-0.5 µm)	$q_{max} = 10^8 e d_p$																					
q_{max}	8.00E-18	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	m/sec	Particle Drift Speed
e	1.60E-19	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	C	Elementary Charge of Electron
d_p	5.00E-07	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	m	Particle Diameter
Max Field Particle Charge (0.2-10 µm)	$q_{max} = 4\pi\varepsilon_0 E_0 d^2_p(3\varepsilon_r/\varepsilon_r+2)$																					
q_{max}	3.62E-18	1.45E-17	3.26E-17	5.80E-17	9.06E-17	1.30E-16	1.78E-16	2.32E-16	2.93E-16	3.62E-16	4.38E-16	5.22E-16	6.12E-16	7.10E-16	8.15E-16	9.27E-16	1.05E-15	1.17E-15	1.31E-15	1.45E-15	C	Coulombs
ε_0	8.85E-12	8.85E-12	8.85E-12	8.85E-12	8.85E-12	8.85E-12	8.85E-12	8.85E-12	8.85E-12	8.85E-12	8.85E-12	8.85E-12	8.85E-12	8.85E-12	8.85E-12	8.85E-12	8.85E-12	8.85E-12	8.85E-12	8.85E-12	C/Vm	Permittivity of Vacuum
E_0	86,832	86,832	86,832	86,832	86,832	86,832	86,832	86,832	86,832	86,832	86,832	86,832	86,832	86,832	86,832	86,832	86,832	86,832	86,832	86,832	V/m	Charging Field Strength
d_p	5.00E-07	1.00E-06	1.50E-06	2.00E-06	2.50E-06	3.00E-06	3.50E-06	4.00E-06	4.50E-06	5.00E-06	5.50E-06	6.00E-06	6.50E-06	7.00E-06	7.50E-06	8.00E-06	8.50E-06	9.00E-06	9.50E-06	1.00E-05	m	Particle Diameter
ε_r	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		Dielectric Constant (approximately 1.5-2.6 for fly ash)

FCCU Bypass (SSM)
Calculated Uncontrolled Emissions based on Collection Efficiency

Stack Test Condition 1	**Controlled Stack Test Emission Rate (lb/hr)**	**ESP Collection Efficiency for 0-2.5 µm (%)**	**Uncontrolled Emission Rate (lb/hr)**	**ESP Collection Efficiency for 2.5-10 µm (%)**	**Uncontrolled Emission Rate (lb/hr)**
Filterable $PM_{2.5}$ Emission Rate	0.42	80.26	**2.13**	98.84	--
Filterable PM_{10} Emission Rate	1.60	80.26	--	98.84	**138.44**
Condensable PM Emission Rate	1.20	80.26	**6.08**	98.84	--
$PM_{2.5}$ Emission Rate[1]	1.70	--	***8.21***	--	--
PM_{10} Emission Rate[2]	3.20	--	--	--	***146.64***

Stack Test Condition 2	**Controlled Stack Test Emission Rate (lb/hr)**	**ESP Collection Efficiency for 0-2.5 µm (%)**	**Uncontrolled Emission Rate (lb/hr)**	**ESP Collection Efficiency for 2.5-10 µm (%)**	**Uncontrolled Emission Rate (lb/hr)**
Filterable $PM_{2.5}$ Emission Rate	0.70	81.07	**3.70**	98.95	--
Filterable PM_{10} Emission Rate	1.80	81.07	--	98.95	**171.78**
Condensable PM Emission Rate	0.87	81.07	**4.60**	98.95	--
$PM_{2.5}$ Emission Rate[1]	1.60	--	***8.29***	--	--
PM_{10} Emission Rate[2]	3.40	--	--	--	***180.07***

[1] $PM_{2.5}$ Emssion Rate is the sum of Filterable $PM_{2.5}$ and Condensable PM

[2] PM_{10} Emission Rate is the sum of the Filterable $PM_{2.5}$, Condensable PM, and the Filterable PM_{10}

FCCU Bypass (SSM)
FCCU Uncontrolled Emission Factor Calculation

Stack Test Condition 1	Controlled Stack Test Emission Rate (lb/hr)	Average Coke Burn Rate (1,000 lb/hr)	Uncontrolled Emission Rate (lb/hr)	Controlled Emission Factor (lb/1,000 lb coke burn)	Uncontrolled Emission Factor (lb/1,000 lb coke burn)
$PM_{2.5}$	1.70	7.04	8.21	0.24	1.17
PM_{10}	3.20	7.04	146.64	0.45	20.83

Stack Test Condition 2	Controlled Stack Test Emission Rate (lb/hr)	Average Coke Burn Rate (1,000 lb/hr)	Uncontrolled Emission Rate (lb/hr)	Controlled Emission Factor (lb/1,000 lb coke burn)	Uncontrolled Emission Factor (lb/1,000 lb coke burn)
$PM_{2.5}$	1.60	5.87	8.29	0.27	1.41
PM_{10}	3.40	5.87	180.07	0.58	30.68

FCCU Bypass (SSM)
Maximum Uncontrolled Emissions based on Maximum Design Cokeburn

Pollutant	Controlled Coke Burn Emission Factor (lb/ 1,000 lb coke burn)	Uncontrolled Coke Burn Emission Factor (lb/ 1,000 lb coke burn)	Max Design Coke Burn (lb/hr)	Controlled Emissions (lb/hr)	Uncontrolled Emissions (lb/hr)
$PM_{2.5}$	0.27	1.41	7,610	2.07	10.75
PM_{10}	0.58	30.68	7,610	4.41	233.45

FCCU Bypass (SSM)
Voltage and Electrical Field Calculations

Zevenhoven and Kilpinen F calc						
	F=ln(4R/πr)+D	**Notes**		**Electrode Number**	**(Coshπ/2 (n)d/r+1)/ (Coshπ/2 (n)d/r+1)**	**D=ln((Coshπ/2 (n)d/r+1)/ (Coshπ/2 (n)d/r+1))**
F	2.2			1	1.05	0.052
Fx	0.22			2	1.03	0.026
V	18,992	Test Condition 1 Average Voltage		3	1.02	0.017
E	**86,832**	Test Condition 1 E		4	1.01	0.013
				5	1.01	0.010
V	19,515	Test Condition 2 Average Voltage			Total:	0.119
E	**89,224**	Test Condition 2 E				
x	0.102	Half distance from electrode to plate				
d	0.39	Distance between wires (m) This is from the engineering drawings				
r	0.025	Wire radius (m)				
R	0.15	Distance to Plate This is from the engineering drawings				
f	2.03	ln (4R/πr)				

Western Refining Southwest, Gallup Refinery
Abrasive Blasting PM, PM_{10}, and $PM_{2.5}$ Emissions

Unit ID Abrasive Blasting

Table E-1. Tank/Vessel Abrasive Blasting Emissions

Blasting material[1]	Copper slag
Usage per Event[1] (lb/hr)	670
Duration of Event[1] (hr/event)	30
Annual Usage (tons/yr)	100.5
Number of Tanks Blasted per year[2]	10
PM Emission Factor[3] (lb PM/lb abrasive)	0.091
PM_{10} Emission Factor[3] (lb PM/lb abrasive)	0.013
$PM_{2.5}$ Emission Factor[3] (lb PM/lb abrasive)	0.0013

	PM	PM_{10}	$PM_{2.5}$
Max Hourly Emissions (lb/hr)[4]	0.609700	0.08710	0.00871
Annual Emissions (tons/yr)[4]	0.091	0.013	0.0013

[1] Abrasive material usage data obtained per e-mail from Michael Puckett at Gallup Refinery
[2] The number of tanks to be blasted per year was provided by Michael Puckett at Gallup Refinery
[3] PM emission factors obtained from AP-42, Table 13.2.6-1
For total PM, the wind speed was chosen to be 15 mph. The corresponding emission factor is 91 lb/1,000 lb abrasive.
[4] Assumed 1% of emissions for PM, PM_{10}, and $PM_{2.5}$ are released as the abrasive blasting procedure at Gallup Refinery is an enclosed procedure, with negligible emissions to the atmosphere.

Western Refining Southwest, Gallup Refinery
Baker Tanks VOC Emissions

Unit ID Baker Tanks

Table F-1. Baker Tanks emissions

Diesel	Recovered Oil	
0.1	5	lb/day[1]
90	90	days
30	2	# of Baker Tanks
0.14	0.45	tpy

[1] TANKS 4.0.9d reports for diesel and recovered oil. The emissions from the diesel TANKS report were 0.039 lb/day. This was rounded up to 0.1 lb/day for the VOC emission calculation.

Total VOC emissions requested for Baker Tanks	0.59	tpy

Short-Term Hourly Emissions from Blowdown of Process Vessels to Atmosphere [1]

Plant Name	Volume (ft^3)	Volume of Gas to Blowdown ($lbmol_{tot}$)	Hours to Blowdown Vessel using Purge Gas	Refinery Process Stream Name	Pressure in Vessel before Gas Released (psig)	Temperature of Gas Released (deg F)	VOC (lb/hr)	H_2S (lb/hr)
Crude Unit	6,000	11	6	Blowdown Purge Gas	5	422.9	1.83E+00	1.68E+00
Platformer	1,252	3	6	Blowdown Purge Gas	5	422.9	5.00E-01	4.59E-01
Naphtha Hydrotreater	3,000	6	6	Blowdown Purge Gas	5	422.9	1.00E+00	9.18E-01
BENSAT (Naphtha splitter)	6,100	11	6	Blowdown Purge Gas	5	422.9	1.83E+00	1.68E+00
FCCU and CO Boiler	14,000	25	6	Blowdown Purge Gas	5	422.9	4.17E+00	3.83E+00
Gas Con Unit	3,500	7	6	Blowdown Purge Gas	5	422.9	1.17E+00	1.07E+00
Hydrofluoric Alkylation Unit	8,000	14	6	Blowdown Purge Gas	5	422.9	2.33E+00	2.14E+00
Isomerization Unit	11,000	19	6	Blowdown Purge Gas	5	422.9	3.17E+00	2.91E+00
Kerosene Hydrotreater	5,200	9	6	Blowdown Purge Gas	5	422.9	1.50E+00	1.38E+00
Distillate Hydrotreater	3,000	6	6	Blowdown Purge Gas	5	422.9	1.00E+00	9.18E-01
Saturated Gas Unit	5,000	9	6	Blowdown Purge Gas	5	422.9	1.50E+00	1.38E+00
Wastewater Treatment (MPPE)	400	1	6	Blowdown Purge Gas	5	422.9	1.67E-01	1.53E-01
Sour Water Stripper	1,300	3	6	Blowdown Purge Gas	5	422.9	5.00E-01	4.59E-01
Amine Unit	1,200	3	6	Blowdown Purge Gas	5	422.9	5.00E-01	4.59E-01
Thiosolv Unit (SWAATS)	7,600	14	6	Blowdown Purge Gas	5	422.9	2.33E+00	2.14E+00
Sulferox SRU	1,500	3	6	Blowdown Purge Gas	5	422.9	5.00E-01	4.59E-01
Treating Units (Merox, etc)	5,000	9	6	Blowdown Purge Gas	5	422.9	1.50E+00	1.38E+00
HC Blowdown Drum	1,000	2	6	Blowdown Purge Gas	5	422.9	3.33E-01	3.06E-01
Total	***84,052***					***Maximum***	***4.17***	***3.83***

[1] It is conservatively assumed that the blowdown of each process area would require the following number of hours: 6

Moles Gas to be Flared	6000 ft^3	(5 psig + 11.3 psi) / (460+422.9 F) R	lbmole R / 10.73 psia ft^3	=	11 lbmole	
VOC Emissions	11 lbmole	1 lb VOC / lbmole	1 / 6 hrs	=	1.83 lb / hr	
H_2S Emissions	11 lbmole	0.92 lb H_2S / lbmole	1 / 6 hrs	=	1.68 lb / hr	

Annual Emissions from Blowdown of Process Vessels to Atmosphere

Plant Name	Vessel Volume (ft3)	Volume of Gas to Blowdown ($lbmol_{tot}$)	Blowdowns per Year using Purge Gas	Refinery Process Stream Name	Pressure in Vessel before Gas Released (psig)	Temperature of Gas Released (deg F)	VOC (tpy)	H2S (tpy)
Crude Unit	6,000	11	1	Blowdown Purge Gas	5	422.9	5.50E-03	5.05E-03
Platformer	1,252	3	2	Blowdown Purge Gas	5	422.9	3.00E-03	2.75E-03
Naphtha Hydrotreater	3,000	6	2	Blowdown Purge Gas	5	422.9	6.00E-03	5.51E-03
BENSAT (Naphtha splitter)	6,100	11	2	Blowdown Purge Gas	5	422.9	1.10E-02	1.01E-02
FCCU and CO Boiler	14,000	25	2	Blowdown Purge Gas	5	422.9	2.50E-02	2.30E-02
Gas Con Unit	3,500	7	2	Blowdown Purge Gas	5	422.9	7.00E-03	6.43E-03
Hydrofluoric Alkylation Unit	8,000	14	1	Blowdown Purge Gas	5	422.9	7.00E-03	6.43E-03
Isomerization Unit	11,000	19	2	Blowdown Purge Gas	5	422.9	1.90E-02	1.74E-02
Kerosene Hydrotreater	5,200	9	2	Blowdown Purge Gas	5	422.9	9.00E-03	8.26E-03
Distillate Hydrotreater	3,000	6	2	Blowdown Purge Gas	5	422.9	6.00E-03	5.51E-03
Saturated Gas Unit	5,000	9	2	Blowdown Purge Gas	5	422.9	9.00E-03	8.26E-03
Wastewater Treatment (MPPE)	400	1	2	Blowdown Purge Gas	5	422.9	1.00E-03	9.18E-04
Sour Water Stripper	1,300	3	2	Blowdown Purge Gas	5	422.9	3.00E-03	2.75E-03
Amine Unit	1,200	3	2	Blowdown Purge Gas	5	422.9	3.00E-03	2.75E-03
Thiosolv Unit (SWAATS)	7,600	14	2	Blowdown Purge Gas	5	422.9	1.40E-02	1.29E-02
Sulferox SRU	1,500	3	2	Blowdown Purge Gas	5	422.9	3.00E-03	2.75E-03
Treating Units (Merox, etc)	5,000	9	2	Blowdown Purge Gas	5	422.9	9.00E-03	8.26E-03
HC Blowdown Drum	1,000	2	2	Blowdown Purge Gas	5	422.9	2.00E-03	1.84E-03
Total	***84,052***						***0.14***	***0.13***

Moles Gas to be Flared	6000 ft^3	(5 psig + 11.3 psi) / (460+422.9 F) R	lbmole R / 10.73 psia ft^3	=	11 lbmole	
VOC Emissions	11 lbmole	1 lb VOC / lbmole	1 Blowdown / yr	ton / 2000 lb	=	5.50E-03 ton / yr
H_2S Emissions	11 lbmole	0.92 lb H_2S / lbmole	1 Blowdown / yr	ton / 2000 lb	=	5.05E-03 ton / yr

Table B-1. Composition (Volume Percent) of Repesentative Refinery Process Streams

Constituent	Volume Percent in Process Stream (%)													
	CPS Blend	FCCU Blend	Alky Blend	Platformer Recycle Gas	SWS Off-Gas	Butane	FCCU Overhead	Sweet Fuel Gas	Sour Fuel Gas	Amine Gas	SWAATS Vent Gas	Acid Gas	Refinery Blend	Blowdown Purge Gas
Ammonia	0	0	0	0	26.4	0	0	0	0	0	5	8.80	2.9	2.90
Water	0	0	0	0	50.1	0	0	0	0	0	0	16.70	5.6	5.60
Hydrogen	0.61	20	0	85.9	0	0	20.114	54.84	54.34	0	0	0.00	26.2	26.20
Nitrogen	1.29	3.75	0	14.1	0	0	15.608	1.01	1.01	0.018	72	0.01	4.1	4.10
Carbon Dioxide	12.12	5.1	0	0.01	0	0	5.906	0.83	0.83	43.341	6	28.89	2.8	2.80
Carbon Monoxide	0	0.9	0	0	0	0	0.988	0.18	0.18	0	0	0.00	0.2	0.20
Oxygen	0.1	0.05	0	0.01	0	0	0.282	0.04	0.04	0	0	0.00	0.1	0.10
Hydrogen Sulfide	0	0	0.1	0	23.5	0.1	0	0.0162	0.5	56.44	0	45.46	2.7	2.70
Sulfur Dioxide	0	0	0	0	0	0	0	0	0	0	17	0.00	0	0.00
Methane	0	31.73	0	0	0	0	23.269	26.13	26.13	0.01	0	0.01	11.9	0.5
Ethane	18.6	13.24	0.2	0	0	0	11.276	7.82	7.82	0.009	0	0.01	6.6	0.3
Ethylene	0.15	12	0	0.02	0	0	12.841	2.73	2.73	0.023	0	0.02	3.4	0.27
Propane	36.67	3.1	0	0	0	0	0.672	3.38	3.38	0.081	0	0.05	5.2	0.21
Propylene	0.1	7.78	0	0	0	0	4.915	1.99	1.99	0	0	0.00	1.9	0.24
Butane	17.9	0.47	99.3	0	0	97	1.81	0.7	0.7	0.008	0	0.01	24.2	0.18
Butene	0.1	1.1	0.4	0.02	0	0.15	0.271	0	0	0	0	0.00	0.2	0.16
Pentane	12.12	0.1	0.1	0.01	0	2	0.487	0	0	0.047	0	0.03	1.6	0.14
Hexane	0	0.3	0	0	0	0.23	0.383	0.11	0.11	0.012	0	0.01	0.1	0.12
Total	***100***	***100***	***100***	***100***	***100***	***99***	***99***	***100***	***100***	***100***	***100***	***100***	***100***	***47***
VOC Content	68	25	100	1	0	100	22	9	9	1	0	1	37	2
H_2S Content	0	0	0.1	0	23.5	0.1	0	0.0162	0.5	56.44	0	45.46	2.7	2.7

Table B-2. Composition (Mass per Unit Volume) of Repesentative Refinery Process Streams

Composition (Mass per Unit Volume) of Representative Refinery Process Streams

Mass per Unit Volume in Process Stream ($lb/lbmol_{tot}$)

Constituent	CPS Blend	FCCU Blend	Alky Blend	Platformer Recycle Gas	SWS Off-Gas	Butane	FCCU Overhead	Sweet Fuel Gas	Sour Fuel Gas	Amine Gas	SWAATS Vent Gas	Acid Gas	Refinery Blend	Blowdown Purge Gas
Ammonia	0.0	0.0	0.0	0.0	4.5	0.0	0.0	0.0	0.0	0.0	0.9	1.5	0.5	0.49
Water	0.0	0.0	0.0	0.0	9.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	1.0	-
Hydrogen	0.0	0.4	0.0	1.7	0.0	0.0	0.4	1.1	1.1	0.0	0.0	0.0	0.5	-
Nitrogen	0.4	1.1	0.0	3.9	0.0	0.0	4.4	0.3	0.3	0.0	20.2	0.0	1.1	-
Carbon Dioxide	5.3	2.2	0.0	0.0	0.0	0.0	2.6	0.4	0.4	19.1	2.6	12.7	1.2	-
Carbon Monoxide	0.0	0.3	0.0	0.0	0.0	0.0	0.3	0.1	0.1	0.0	0.0	0.0	0.1	-
Oxygen	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	-
Hydrogen Sulfide	0.00	0.00	0.03	0.00	7.99	0.03	0.00	0.01	0.17	19.19	0.00	15.46	0.92	0.9180
Methane	0.0	5.1	0.0	0.0	0.0	0.0	3.7	4.2	4.2	0.0	0.0	0.0	1.9	0.080
Ethane	5.6	4.0	0.1	0.0	0.0	0.0	3.4	2.3	2.3	0.0	0.0	0.0	2.0	0.090
Ethylene	0.0	3.4	0.0	0.0	0.0	0.0	3.6	0.8	0.8	0.0	0.0	0.0	1.0	0.076
Propane	16.1	1.4	0.0	0.0	0.0	0.0	0.3	1.5	1.5	0.0	0.0	0.0	2.3	0.092
Propylene	0.0	3.3	0.0	0.0	0.0	0.0	2.1	0.8	0.8	0.0	0.0	0.0	0.8	0.101
Butane	10.4	0.3	57.6	0.0	0.0	56.3	1.0	0.4	0.4	0.0	0.0	0.0	14.0	0.104
Butene	0.1	0.6	0.2	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.1	0.090
Pentane	8.7	0.1	0.1	0.0	0.0	1.4	0.4	0.0	0.0	0.0	0.0	0.0	1.2	0.101
Hexane	0.0	0.3	0.0	0.0	0.0	0.2	0.3	0.1	0.1	0.0	0.0	0.0	0.1	0.103
VOC Content	***36.00***	***10.00***	***58.00***	***1.00***	***0.00***	***58.00***	***8.00***	***4.00***	***4.00***	***1.00***	***0.00***	***1.00***	***20.00***	***1.00***
H_2S Content	***0.00***	***0.00***	***0.03***	***0.00***	***7.99***	***0.03***	***0.00***	***0.01***	***0.17***	***19.19***	***0.00***	***15.46***	***0.92***	***0.92***

Table B-3. Heating Values of Representative Refinery Process Streams [1]

Heating Values (Btu/lbmol$_{tot}$)

Constituent	CPS Blend	FCCU Blend	Alky Blend	Platformer Recycle Gas	SWS Off-Gas	Butane	FCCU Overhead	Sweet Fuel Gas	Sour Fuel Gas	Amine Gas	Acid Gas	Refinery Blend
Hydrogen	749	24,559	0	105,445	0	0	24,699	67,341	66,727	0	0	32,173
Nitrogen	0	0	0	0	0	0	0	0	0	0	0	0
Carbon Dioxide	0	0	0	0	0	0	0	0	0	0	0	0
Carbon Monoxide	0	1,095	0	0	0	0	1,202	219	219	0	0	243
Oxygen	0	0	0	0	0	0	0	0	0	0	0	0
Hydrogen Sulfide	0	0	240	0	56,433	240	0	39	1,201	135,536	109,169	6,484
Methane	0	121,700	0	0	0	0	89,248	100,221	100,221	38	26	45,642
Ethane	122,166	86,961	1,314	0	0	0	74,062	51,362	51,362	59	39	43,349
Ethylene	910	72,768	0	146	0	0	77,868	16,555	16,555	139	93	20,618
Propane	355,370	30,042	0	0	0	0	6,512	32,756	32,756	785	523	50,393
Propylene	884	68,791	0	0	0	0	43,459	17,596	17,596	0	0	16,800
Butane	228,081	5,989	1,265,279	0	0	1,235,972	23,063	8,919	8,919	102	68	308,356
Butene	1,201	13,212	4,804	204	0	1,802	3,255	0	0	0	0	2,402
Pentane	183,969	1,518	1,518	76	0	30,358	7,392	0	0	713	476	24,286
Hexane	0	5,408	0	0	0	4,146	6,904	1,983	1,983	216	144	1,803
Heating Value	893,400	432,100	1,273,200	105,900	56,500	1,272,600	357,700	297,000	297,600	137,600	110,600	552,600
Heating Value (Btu/scf)	2358	1141	3360	280	150	3358	944	784	786	364	292	1459

[1] Obtained from Western based on process data.

Stream Molecular Weight

Constituent	CPS Blend	FCCU Blend	Alky Blend	Platformer Recycle Gas	SWS Off-Gas	Butane	FCCU Overhead	Sweet Fuel Gas	Sour Fuel Gas	Amine Gas	Refinery Blend
Molecular Weight (lb/lbmol)	47	22	58	6	21	58	23	12	12	38	29
Reference	Calculated	Calculated	Calculated	Calculated	Calculated	Calculated	Calculated	Calculated	Calculated	Calculated	Calculated

[a] Molecular weight of each stream is calculated based on the composition data contained in Table B-1.

Venting Emissions during Thiosolv Shutdown [1,2]

Process Unit Name	Venting Gas Volume (scf)	Refinery Process Stream Name	SO_2 Content (vol.%)	SO_2 Emissions (lb/hr)	SO_2 Emissions (tpy)
SWAATS (TV-1)	250	SWAATS Vent Gas	17	7.18	0.0027

[1]It is assumed that the venting duration is 0.75 hour

[2]It is also assumed that the number of venting events is 1 per year

SO_2 Hourly Emissions:

$$\frac{250\ \text{scf}}{\text{hr}} \times \frac{1\ \text{lb-mol}}{379\ \text{scf}} \times \frac{64\ \text{lb } SO_2}{1\ \text{lb-mol}} \times 17\%\ SO_2 = \frac{7.18\ \text{lb}}{\text{hr}}$$

SO_2 Annual Emissions:

$$\frac{7.18\ \text{lb}}{\text{hr}} \times \frac{1\ \text{hr}}{\text{event}} \times \frac{1\ \text{event}}{\text{yr}} \times \frac{\text{ton}}{2000\ \text{lb}} = \frac{0.003\ \text{ton}}{\text{yr}}$$

Small Equipment List [1]

Unit Name	PRVs	Valves	Pumps	Compressors	Condensers	Heat Exchangers
Alkylation	25	1,402	13	0	5	5
Boiler House	1	105	0	0	5	5
Crude Unit	11	1,334	21	0	10	10
DHT	29	1,810	11	3	5	5
FCCU	4	597	12	0	5	5
GasCon	12	637	7	4	5	5
Isomerization	16	1,078	8	2	5	5
NHT	11	987	8	0	5	5
Platformer	8	716	4	3	5	5
Gas Saturation Unit	18	1,023	12	2	5	5
SRU	4	155	2	0	5	5
SWAATS	10	141	0	0	5	5
Tank farm	97	3,520	84	0	10	10
Treaters	8	367	4	0	5	5
	254	***13,872***	***186***	***14***	***80***	***80***

[1] The following number of heat exchangers and condensers was conservatively assumed, per most process areas (Note that more were assumed for the Crude unit and Tank farm): 5

Small Equipment Data

Equipment Type	Number per unit	Surface Area per unit (ft^2)	Volume per unit (ft^3)
PRVs	254	5	5
Valves	13,872	5	5
Pumps	186	5	5
Compressors	14	5	5
Condensers	80	10	10
Heat Exchangers	80	10	10

Small Equipment Volumes

Unit Name	PRVs	Valves	Pumps	Compressors	Condensers	Heat Exchangers	Total
Alkylation	125	7,010	65	0	50	50	7,300
Boiler House	5	525	0	0	50	50	630
Crude Unit	55	6,670	105	0	100	100	7,030
DHT	145	9,050	55	15	50	50	9,365
FCCU	20	2,985	60	0	50	50	3,165
GasCon	60	3,185	35	20	50	50	3,400
Isomerization	80	5,390	40	10	50	50	5,620
NHT	55	4,935	40	0	50	50	5,130
Platformer	40	3,580	20	15	50	50	3,755
Gas Saturation Unit	90	5,115	60	10	50	50	5,375
SRU	20	775	10	0	50	50	905
SWAATS	50	705	0	0	50	50	855
Tank farm	485	17,600	420	0	100	100	18,705
Treaters	40	1,835	20	0	50	50	1,995
	1,270	***69,360***	***930***	***70***	***800***	***800***	***73,230***

Maximum Hourly Emissions from Small Equipment Blowdown

Plant Name	Volume of Largest Component (ft3)	Refinery Process Stream Name	Temperature of Gas Released (deg F)	VOC (lb/hr)	H2S (lb/hr)
Platformer	10	Alky Blend	70	1.66	9.75E-04
Boiler House	10	Refinery Blend	70	0.57	2.63E-02
Crude Unit	10	CPS Blend	70	1.03	0.00E+00
DHT	10	Refinery Blend	70	0.57	2.63E-02
FCCU	10	FCCU Blend	70	0.29	0.00E+00
Distillate Hydrotreater	10	Butane	70	1.66	9.75E-04
Saturated Gas Unit	10	Refinery Blend	70	0.57	2.63E-02
NHT	10	Refinery Blend	70	0.57	2.63E-02
Platformer	10	Platformer Recycle Gas	70	0.03	0.00E+00
Gas Saturation Unit	10	Refinery Blend	70	0.57	2.63E-02
SRU	10	Sour Fuel Gas	70	0.11	4.87E-03
SWAATS	10	Sour Fuel Gas	70	0.11	4.87E-03
Tank Farm	10	Refinery Blend	70	0.57	2.63E-02
Treaters	10	Refinery Blend	70	0.57	2.63E-02
Total				***8.91***	***0.20***

Hourly Emissions (ALKY Blend): $\frac{58\text{ lb VOC}}{\text{lbmole}} \left| \frac{10\text{ ft}^3}{\text{hr}} \right| \frac{(11.3\text{ psi} + 5\text{ psig})}{(460 + 70)\text{ R}} \left| \frac{\text{lbmole R}}{10.73\text{ psia ft}^3} \right. = \frac{1.66\text{ lb}}{\text{hr}}$

Annual Emissions from Small Equipment Blowdown

Plant Name	Volume (ft3)	Refinery Process Stream Name	Temperature of Gas Released (deg F)	Number of Blowdowns per Year	VOC (tpy)	H2S (tpy)
Platformer	7,300	Alky Blend	70	1	0.61	3.56E-04
Boiler House	630	Refinery Blend	70	2	0.04	1.66E-03
Crude Unit	7,030	CPS Blend	70	1	0.36	0.00E+00
DHT	9,365	Refinery Blend	70	2	0.54	2.46E-02
FCCU	3,165	FCCU Blend	70	2	0.09	0.00E+00
Distillate Hydrotreater	3,400	Butane	70	2	0.57	3.31E-04
Saturated Gas Unit	5,620	Refinery Blend	70	2	0.32	1.48E-02
NHT	5,130	Refinery Blend	70	2	0.29	1.35E-02
Platformer	3,755	Platformer Recycle Gas	70	2	0.01	0.00E+00
Gas Saturation Unit	5,375	Refinery Blend	70	2	0.31	1.41E-02
SRU	905	Sour Fuel Gas	70	2	0.01	4.41E-04
SWAATS	855	Sour Fuel Gas	70	2	0.01	4.17E-04
Tank Farm	18,705	Refinery Blend	70	2	1.07	4.92E-02
Treaters	1,995	Refinery Blend	70	2	0.11	5.25E-03
Total					***4.34***	***1.25E-01***

$$\text{Annual Emissions (ALKY Blend): } \frac{58\text{ lb VOC}}{\text{lbmole}} \left| \frac{7300\text{ ft}^3}{\text{blowdown}} \right| \frac{(11.3\text{ psi} + 5\text{ psig})}{(460 + 70)\text{ R}} \left| \frac{\text{lbmole R}}{10.73\text{ psia ft}^3} \right| \frac{1\text{ blowdowns}}{\text{yr}} \left| \frac{\text{ton}}{2000\text{ lb}} \right. = \frac{0.61\text{ ton}}{\text{yr}}$$

Surface Coating Composition Data [1, 2]

Application	VOC Weight Percent (wt. %)	Solids Weight Percent[2] (wt %)	Density (lb/gal)	VOC Content (lb/gal)	PM Content (lb/gal)
Standard Industrial Enamel	40	20	10.00	4.00	2.00
Cleaning Solvent	100	0	7.5	7.50	0.00
450H White Resin	20	20	13.11	2.62	2.62
450H Cure	37	20	8.60	3.18	1.72
2/400 White Resin	5	20	12.77	0.64	2.55
400 Cure	35	20	11.67	4.09	2.33
Worst Case	37	20	13.11	4.09	2.62
Routine Surface Coating Operations		20	10.00	3.00	2.00
Tank Surface Coating Operations		20	13.11	3.50	2.62

[1] The VOC limit for tank surface coating operations is specified in 30 TAC 115.421(a)(9)(iv) (surface coating VOC limits for miscellaneous metal parts and products - high-performance coating applications).
Per the definition in 30 TAC 115.420(b)(7)(C), extreme performance coatings are defined as coatings are subject to continuous outdoor exposure, which would be the case for storage tank coatings.

[2] Per engineering judgement after internet review of typical solids content of paints

[3] Worst case is for paint (excludes enamael and cleaning solvent)

Tank Surface Coating Data

Year	Number of Tanks to be Painted
2011	3
2012	3
2013	3
2014	3
2015	3

Surface Coating Usage Data [1, 2, 3]

Average Volume of Paint Used Per Tank (gal)	80
Total Estimated Volume of Paint Purchased for Routine Painting (gal/yr)	2233
Approximate Solvent Usage per Amount of Paint (%)	25

1 Approximate tank surface coating usage information was provided by Michelle Young (refinery services mng) to Ed Riege in August 2009.
2 Total volume of coatings used in routine surface coating operations as provided by Western.
3 Solvent usage is assumed to be approximately 25% of coating usage on average.

Surface Coating Application Data [1, 2, 3, 4]

Transfer Efficiency (%)	80
TSP Content of PM (%)	20
Maximum Paint Usage for Routine Surface Coating (gal/hr)	5
Maximum Paint Usage for Tank Surface Coating (gal/hr)	2

1 For airless application to an approximately flat surface, a transfer efficiency of 80% is obtained from Table 1 of TCEQ, *Air Permit Technical Guidance for Coatings Sources, Surface Coating Operations*, April 2001.
in the calculations based on process experience with other spray coating industries.
2 It is conservatively assumed that 1 five gallon coating can could be applied in a 1-hour period during routine surface coating operations.
3 It is conservatively assumed that the duration of time required to paint a single tank is approximately 1 week, at 8 hours per day.
It is also conservatively estimated that surface coating could be applied to 1 tank in the refinery at any given time.
4 It is conservatively assumed that 20% of the droplets are 30 microns in diameter.
Per TCEQ, Painting Basics and Emission Calculations for TCEQ Air Quality Permit Applications, October 2006,
high transfer efficiency application equipment will have over 90 % of the droplets greater than 30 microns in diameter
while air atomized equipment may have less than 80 % of the droplets greater than 30 microns in diamter.

Short-Term Hourly Tank Surface Coating Emissions [1]

Year	Tank Painting		Solvent		VOC	PM
	VOC (lb/hr)	PM (lb/hr)	VOC (lb/hr)	PM (lb/hr)	(lb/hr)	(lb/hr)
2011	7.00	0.21	3.75	-	10.75	0.21
2012	7.00	0.21	3.75	-	10.75	0.21
2013	7.00	0.21	3.75	-	10.75	0.21
2014	7.00	0.21	3.75	-	10.75	0.21
2015	7.00	0.21	3.75	-	10.75	0.21
Future	7.00	0.21	3.75	-	10.75	0.21

[1] The worst case VOC speciation fractions are used for emission calculations of VOC species.

Annual Tank Surface Coating Emissions [1]

Year	Tank Painting		Solvent		VOC	PM
	VOC (tpy)	PM (tpy)	VOC (tpy)	PM (tpy)	(tpy)	(tpy)
2011	0.42	0.01	0.23	-	0.65	0.01
2012	0.42	0.01	0.23	-	0.65	0.01
2013	0.42	0.01	0.23	-	0.65	0.01
2014	0.42	0.01	0.23	-	0.65	0.01
2015	0.42	0.01	0.23	-	0.65	0.01
Future	0.42	0.01	0.23	-	0.65	0.013

[1] The worst case VOC speciation fractions are used for emission calculations of VOC species.

Short-Term Hourly Routine Surface Coating Emissions [1]

Year	Routine Painting VOC (lb/hr)	Routine Painting PM (lb/hr)	Solvent VOC (lb/hr)	Solvent PM (lb/hr)	VOC (lb/hr)	PM (lb/hr)
2011	15.00	0.40	9.38	-	24.38	0.40
2012	15.00	0.40	9.38	-	24.38	0.40
2013	15.00	0.40	9.38	-	24.38	0.40
2014	15.00	0.40	9.38	-	24.38	0.40
2015	15.00	0.40	9.38	-	24.38	0.40
Future	15.00	0.40	9.38	-	24.38	0.40

[1] The worst case VOC speciation fractions are used for emission calculations of VOC species.

Annual Routine Surface Coating Emissions [1]

Year	VOC (tpy)	PM (tpy)	VOC (tpy)	PM (tpy)	VOC (tpy)	PM (tpy)
2011	3.35	0.09	2.09	-	5.44	0.09
2012	3.35	0.09	2.09	-	5.44	0.09
2013	3.35	0.09	2.09	-	5.44	0.09
2014	3.35	0.09	2.09	-	5.44	0.09
2015	3.35	0.09	2.09	-	5.44	0.09
Future	3.35	0.09	2.09	-	5.44	0.09

[1] The worst case VOC speciation fractions are used for emission calculations of VOC species.

Hourly VOC Paint Surface Coating Emissions:

$$\frac{3.50\text{ lb VOC}}{\text{gal}} \times \frac{4\text{ gal}}{\text{hr}} = \frac{7.00\text{ lb}}{\text{hr}}$$

Annual VOC Paint Surface Coating Emissions:

$$\frac{3.50\text{ lb VOC}}{\text{gal}} \times \frac{80\text{ gal}}{\text{tank}} \times \frac{3\text{ tanks}}{\text{yr}} \times \frac{\text{ton}}{2000\text{ lbs}} = 0.42\text{ tpy}$$

Hourly VOC Solvent Surface Coating Emissions:

$$\frac{7.5\text{ lb VOC}}{\text{gal}} \times \frac{4\text{ gal}}{\text{hr}} \times \frac{25\%\text{ solvent usage}}{\text{paint usage}} = \frac{3.75\text{ lb}}{\text{hr}}$$

Annual VOC Solvent Surface Coating Emissions:

$$\frac{7.5\text{ lb VOC}}{\text{gal}} \times \frac{80\text{ gal}}{\text{tank}} \times \frac{3\text{ tanks}}{\text{yr}} \times \frac{\text{ton}}{2000\text{ lbs}} \times \frac{25\%\text{ solvent usage}}{\text{paint usage}} = 0.23\text{ tpy}$$

Hourly PM Surface Coating Emissions:

$$\frac{2.62\text{ lb PM}}{\text{gal}} \times \frac{4\text{ gal}}{\text{hr}} \times 100\%\text{-}80\%\text{ transfer efficiency} \times 20\%\text{ TSP in PM} = \frac{0.21\text{ lb}}{\text{hr}}$$

Annual PM Surface Coating Emissions:

$$\frac{2.62\text{ lb PM}}{\text{gal}} \times \frac{80\text{ gal}}{\text{tank}} \times \frac{3\text{ tanks}}{\text{yr}} \times \frac{\text{ton}}{2000\text{ lbs}} \times 100\%\text{-}80\%\text{ transfer efficiency} \times 20\%\text{ TSP in PM} = 0.01\text{ tpy}$$

Tank Degassing Emissions [1, 2, 3]

Tank Name	Tank Type	P (psia)	V (ft^3)	R (psi-ft^3/lb-mol-°R)	T (°R)	n (lb-mol)	Material Stored	Density Vapor (lb/lb-mole)	VOC Losses from Degassing Vapor Space Prior to Cleaning (lb/hr)	(tpy)
T-108	Internal Floating Roof	3.80	6,170	10.731	519.7	4.20	alkylate	70	1.02	0.04
T-581	Internal Floating Roof	0.01	24,680	10.731	547.7	0.04	LCO	130	0.02	6.82E-04
T-344	Internal Floating Roof	1.90	19,792	10.731	530.7	6.60	reformate	75	1.72	0.06
T-3	Internal Floating Roof	5.00	4,948	10.731	519.7	4.44	gasoline	67	1.03	0.04
T-571	External Floating Roof	6.30	24,680	10.731	530.7	27.30	gasoline	67	6.35	0.23
T-572	External Floating Roof	6.30	24,680	10.731	530.7	27.30	gasoline	67	6.35	0.23
T-574	External Floating Roof	5.70	39,722	10.731	530.7	39.76	gasoline	62	8.56	0.31

[1] Losses from purging the vapors out of the headspace prior to cleaning are calculated using ideal gas law, assuming a saturation factor of 0.25.

L = (P*Vv*Mv*S)/(R*T)

L = degassing loss, lb

P = true vapor pressure of the liquid within the tank, psia

T = average temperature of the vapor and liquid below the floating roof, R

V_V = vapor space volume under legs (assuming legs at 7ft)

M_V = vapor molecular weight, lb/lb-mole

S = filling saturation factor, dimensionless (0.25 for degassing)

R = ideal gas constant, psia-ft^3/(lb-mole-°R) = 10.731

[2] It is assumed that the required time to purge the vapors is: 72 hrs

[3] It is assumed that there is one degassing event per year for each tank.

Tank Standing and Filling Losses

Standing and Filling Losses

1. Internal Floating Roof Tanks

Standing Idle Losses [1]

Tank ID	Product Stored	Tank Diameter (D) (ft)	Vapor Space Height (h_v) (ft)	n_d (days)	K_E	P (psia)	V_V (ft^3)	T (°R)	M_V (lb/lb-mole)	K_S	L_{SL} (lbs/yr)	L_{SL} (lb/hr)
T-108	alkylate	33.5	7	2	0.3375	3.8	6,170	520	70	0.41	82.4	1.7
T-581	LCO	67	7	2	0.0948	0.01	24,680	548	130	1.00	1.0	0.0
T-344	reformate	60	7	2	0.193	1.9	19,792	531	75	0.59	112.1	2.3
T-3	gasoline	30	7	2	0.4379	5	4,948	520	67	0.35	91.2	1.9
Total											286.8	6.0

[1] Calcuated using equation 2-16 in AP-42 Section 7 (Storage tanks)

$L_{SL} = n_d K_E (PV_v /RT) M_v K_s$

Where,

L_{SL} = standing loss, lb/yr

R = ideal gas constant, psi-cuft/lb-mol-°R = 10.731

n_d = number of days the tank stands idle

P = true vapor pressure of stock liquid, psia

V_V = volume of vapor space, ft^3

$V_V = \pi * D^2/4 * h_v$

h_v = height of vapor space (leg height)

T = temperature, °R

M_v = stock vapor molecular weight, lb/lb-mol

K_E = vapor space expansion factor

Obtained from TANKS for fixed roof tanks with same contents.

K_S = saturation factor = 1/[1+0.053(P*leg height)]

$K_S = 1/[1+0.053(P*h_v)]$

Tank Standing and Filling Losses

Standing and Filling Losses

2. External Floating Roof Tanks

Standing Idle Losses [1]

Tank ID	Product Stored	Tank Diameter D (ft)	n_d (days)	P_{VA} [2] (psia)	P_A (psia)	P^*	Mv mole)	L_{SL} (lbs/day)	(lb/hr)
T-571	gasoline	67	2	6.3	11.3	0.20	67	1028.9	42.9
T-572	gasoline	67	2	6.3	11.3	0.20	67	1028.9	42.9
T-574	gasoline	85	2	5.7	11.3	0.17	62	1043.7	43.5
Total								3101.6	129.2

[1] Calcuated using equation 2-19 in AP-42 Section 7 (Storage tanks)

$L_{sl} = 0.57 n_d D P^* M_v$

Where,

L_{SL} = standing loss, lb/day

n_d = number of days the tank stants idle

D = diameter, ft

M_v = stock vapor molecular weight, lb/lb-mol

P*= vapor pressure function

$P^* = (P_{VA}/P_A)/[1+(1-P_{VA}/P_A)^{0.5}]^2$

P_{VA} = vapor pressure at daily average liquid surface temperature, psia

P_A = atmosphere pressure, psia, from TANKS 4.0.9d

[2] P_{VA} conservatively assumed to be equal to maximum vapor pressure

Tank Clingage Losses

1. Clingage Loss for Drain Dry Tanks [1,2]

Tank ID	Product Stored	Tank Diameter (D) (ft)	C_s (bbl/1000 ft^3)	W_l (lb/gal)	P (psia)	Leg Height (ft)	Vv (ft^3)	T (°R)	Mv (lb/lb-mole)	Lc [2] (lb)	Lc [2] (lb/hr)
T-108	alkylate	33.5	0.0015	5.9	3.8	7	6,170	519.67	70	176.6	7.4
T-581	LCO	67	0.0015	7.1	0.01	7	24,680	547.67	130	3.3	0.1
T-344	reformate	60	0.0015	6.5	1.9	7	19,792	530.67	75	297.2	12.4
T-3	gasoline	30	0.0015	5.7	5	7	4,948	519.67	67	178.3	7.4
T-571	gasoline	67	0.0015	5.7	6.3	7	24,680	530.67	67	1,097.6	45.7
T-572	gasoline	67	0.0015	5.7	6.3	7	24,680	530.67	67	1,097.6	45.7
T-574	gasoline	85	0.0015	5.6	5.7	7	39,722	530.67	62	1,479.0	61.6

[1] Calculated using AP-42 Section 7 (Storage tanks) where Standing Loss is the minimum of the following equations:

$Lc = 42\, C_s\, W_l\, (\pi\, D^2/4)$ Eqn 2-20

Where,

Lc = clingage loss, lb

D = Diameter, ft

Cs = clingage factor, bbl/1000 ft^2 from AP 42 Table 7.1-10

W_l = density of the liquid, lb/gal from TANKS 4.0.9 d

Lc, max = 0.60 (PVv/RT)Mv Eqn 2-23

Where,

Lc, max = maximum clingage loss, lb

P = True vapor pressure of liquid inside tank, psia

V_v = Volume of vapor space, ft^3

R = Ideal gas constant, 10.731 psia ft^3 / lb-mol °R

T = Average temperature of vapor and liquid below floating roof, °R

M_v = Stock vapor molecular weight, lb/lb-mol

[2] It is assumed that all clingage loss occurs over a 24 hour period and that each tank has one clingage loss

Tank Clingage Losses

2. Filling Loss for Drain Dry Tanks [1,2]

Tank ID	Product stored	P (psia)	Leg Height (ft)	Vv (ft^3)	T (°R)	Mv (lb/lb-mole)	S	Refill Time [2] (hrs)	L_{FL} (lb)	L_{FL} (lb/hr)
T-108	alkylate	3.8	7	6,170	519.67	70	0.15	2.3	44.1	19.1
T-581	LCO	0.01	7	24,680	547.67	130	0.15	9.2	0.8	0.1
T-344	reformate	1.9	7	19,792	530.67	75	0.15	7.4	74.3	10.0
T-3	gasoline	5	7	4,948	519.67	67	0.15	1.9	44.6	24.1
T-571	gasoline	6.3	7	24,680	530.67	67	0.15	9.2	274.4	29.7
T-572	gasoline	6.3	7	24,680	530.67	67	0.15	9.2	274.4	29.7
T-574	gasoline	5.7	7	39,722	530.67	62	0.15	14.9	369.8	24.9

[1] Calculated using equation 2-26 in AP-42 Section 7 (Storage tanks)

L_{FL} = (P*Vv*Mv*S)/(R*T)

L_{FL} = filling losses, lb

P = true vapor pressure of the liquid within the tank, psia

T = average temperature of the vapor and liquid below the floating roof, R

Vv= vapor space volume, ft^3

Mv = vapor molecular weight, lb/lb-mole

S = filling saturation factor, dimensionless (0.15 for a drain-dry tank)

R = Ideal gas constant, 10.731 psia ft^3 / lb-mol °R

[2] Refill time based on a pump rate of 20,000 gallons per hour

Tank Landing Loss Emissions

1. Landing Loss Hourly Emissions

Tank Name	Tank Type	Standing Losses (lb/hr)	Clingage Losses (lb/hr)	Refilling Losses (lb/hr)
108	Internal Floating Roof	1.72	7.36	19.13
581	Internal Floating Roof	0.02	0.14	0.09
344	Internal Floating Roof	2.34	12.38	10.04
3	Internal Floating Roof	1.90	7.43	24.09
571	External Floating Roof	42.87	45.73	29.73
572	External Floating Roof	42.87	45.73	29.73
574	External Floating Roof	43.49	61.63	24.89

2. Landing Loss Annual Emissions [1]

Tank Name	Tank Type	Standing Losses (tpy)	Clingage Losses (tpy)	Refilling Losses (tpy)
108	Internal Floating Roof	0.04	0.09	0.02
581	Internal Floating Roof	0.00	0.00	0.00
344	Internal Floating Roof	0.06	0.15	0.04
3	Internal Floating Roof	0.05	0.09	0.02
571	External Floating Roof	0.51	0.55	0.14
572	External Floating Roof	0.51	0.55	0.14
574	External Floating Roof	0.52	0.74	0.18

[1] It is assumed that each tank has one landing loss per year

Hourly and Annual Emissions from Catalyst/Salt Loading [1]

Sources	Loading Parameters						Depressurization Parameters					PM10 Emission Rate					
	Loading Throughput	Loading Duration	Loading Frequency	Number of Loadings per Year	Handling Process Loss	PM10 Content	Vent Opening Size	Duration	Pressure Change	Depressurization Loss	PM10 Content	Loading Emissions		Depressurization Emissions		Total Emissions	
	(lb/loading)	(hr)			(wt.%)	(wt.%)	(inch)	(hr)	(psi)	(wt.%)	(wt.%)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
FCCU catalyst storage hopper vent	20,000	1	twice per month	24	1.00%	0.60%	4	0.33	70-14	1.00%	0.60%	1.20	0.014	3.60	0.014	4.80	0.029
FCCU SOx additive hopper vent	350	0.033	48 times per day	17520	1.00%	0.60%	4	0.33	70-14	1.00%	0.60%	0.64	0.184	0.06	0.184	0.70	0.368
FCCU catalyst storage hopper vent	90	0.033	24 times per day	8760	1.00%	0.60%	4	0.33	70-14	1.00%	0.60%	0.16	0.024	0.02	0.024	0.18	0.047
FCCU CO promoter feed manual load fugitive	8	0.25	once per day	365	1.00%	1.00%	1	0.17	100-14	1.00%	1.00%	0.00	0.000	4.80E-03	1.46E-04	8.00E-03	2.92E-04
Salt loading into storage tank	50,000	1	2 times a week	104	0.00%	1.00%						0.00	0.000			0.00	0.000
															Maximum	4.80	0.37

1 Loading rates, handling and depressurization losses, and PM10 content, are estimated based on equipment design and process knowledge.

Sample Calculation:

Hourly Loading Emissions:		20,000 lb / loading	1 / 1hr	1% Processing Loss	0.6% PM10	=	1.20 lb / hr
Hourly Depressurization Emissions:		20,000 lb / loading	60 min/hr / 20 min	1% Depressurization Loss	0.6% PM10	=	3.60 lb / hr
Annual Loading Emissions:	20,000 lb / loading	24 loadings / yr	1% Processing Loss	0.6% PM10	ton / 2000 lbs	=	0.01 tpy
Annual Depressurization Emissions:	20,000 lb / loading	24 loadings / yr	1% Depressurization Loss	0.6% PM10	ton / 2000 lbs	=	0.01 tpy

Western Refining Southwest, Inc. - Gallup Refinery
Unit PECS (Portable Emission Control System)

Unit ID	PECS	
Unit Description	Vapor combustion unit to control VOC emissions at truck loading rack during VRU maintenance	
Maximum Hourly Loading Rate[1]	2514	bbl/hr
Maximum 24 hour Loading Rate[2]	25,984	bbl/d
Proposed Hours of Operation[3]	336	hrs/yr

[1] Data provided by Western to John Zink for design basis of the vapor combustion unit

[2] The maximum 24 hour loading rate was based on the actual daily loading information from July 26, 2016 through July 30, 2016.

[3] Proposed hours of operation were calculated based on information from operations that the 2016 event lasted 5 days. To account for the possibility that the event could have a longer duration during future VRU maintenance activities, Western would like to permit the unit for 14 days.

Uncontrolled Emissions

NO_x	CO	VOC		Notes
4	10	10	mg/L[1]	
0.033	0.083	0.083	lb/1000-gal loaded	
3.53	8.81	8.81	lb/hr	
0.26	0.64	0.64	tpy	Proposed Emissions (336 hr/yr)
6.6	16.6	16.6	tpy	Emissions (8760 hr/yr)

[1] John Zink guaranteed emission factors for portable emission control system

Western Refining Southwest, Gallup Refinery
Heater/Boiler Startup CO Emissions

Unit ID Heater/Boiler Startup

Table 1. Short-Term Hourly Emissions from Heater/Boiler Startup

Equipment Name	Maximum Firing Duty[1] (MMBtu/hr)	Average Firing During Startup (MMBtu/hr)	Startup CO Concentration[2] (ppmv)	Duration of Startup[3] (hrs)	Startup CO Emission Factor[4] (lb/MMBtu)	CO (lb/hr)
Boiler Z-81-B104	52	26	1000	4	0.731	19.0
Boiler Z-81-B105	52	26	1000	4	0.731	19.0
Boiler Z-81-B102	66	33	1000	4	0.731	24.1
Boiler Z-81-B106	97	48	1000	4	0.731	35.3
C-H1	77	39	1000	4	0.731	28.1
C-H2	31	15	1000	4	0.731	11.1
C-H5	32	16	1000	4	0.731	11.5
H-F1	23	12	1000	4	0.731	8.4
H-F2	15	8	1000	4	0.731	5.5
P-H1	49	25	1000	4	0.731	17.9
P-H2	33	17	1000	4	0.731	12.1
A-H2	23	12	1000	4	0.731	8.4
I-H1	13	7	1000	4	0.731	5.1
I-H2	7	4	1000	4	0.731	2.7
D-H1A	7	4	1000	4	0.731	2.6
D-H2	7	3	1000	4	0.731	2.5
D-H3	10	5	1000	4	0.731	3.6
Worst case CO hourly emission rates (based on the two highest emission rates for combustion units) =						***63.5***

[1] Maximum firing duty per NSR Permit 0633-M12R2
[2] Startup CO concentration based on a similar calculation for a Western facility, permitted under TCEQ
[3] Provided by Western as response to SSM data request on 12/2/2011
[4] Startup CO Emission Factor = $\frac{1000 \text{ ppmv}}{} \quad X \quad \frac{1}{1368} \frac{\text{lb/MMBtu}}{\text{ppmv}}$

The 1368 ppmv/ (lb/MMBtu) conversion factor was obtained from the following website:

http://www.johnsonburners.com/resourceeng/Emission%20Conversion%20Factors.pdf

Hourly Emissions: $\frac{0.731 \text{ lb}}{\text{MMBtu}} \Big| \frac{26 \text{ MMBtu}}{\text{hr}} = \frac{19.0 \text{ lb}}{\text{hr}}$

Table 2. Annual Emissions from Heater/Boiler Startup

Equipment Name	Maximum Firing Duty[1] (MMBtu/hr)	Average Firing During Startup (MMBtu/hr)	Startup CO Concentration[2] (ppmv)	Duration of Startup[3] (hrs)	Number of Startups per year[3]	Startup CO Emission Factor[4] (lb/MMBtu)	CO (tpy)
Boiler Z-81-B104	52	26	1000	4	2	0.731	0.076
Boiler Z-81-B105	52	26	1000	4	2	0.731	0.076
Boiler Z-81-B102	66	33	1000	4	2	0.731	0.096
Boiler Z-81-B106	97	48	1000	4	2	0.731	0.14
C-H1	77	39	1000	4	2	0.731	0.11
C-H2	31	15	1000	4	2	0.731	0.045
C-H5	32	16	1000	4	2	0.731	0.046
H-F1	23	12	1000	4	2	0.731	0.034
H-F2	15	8	1000	4	2	0.731	0.022
P-H1	49	25	1000	4	2	0.731	0.072
P-H2	33	17	1000	4	2	0.731	0.048
A-H2	23	12	1000	4	2	0.731	0.034
I-H1	13	7	1000	4	2	0.731	0.020
I-H2	7	4	1000	4	2	0.731	0.011
D-H1A	7	4	1000	4	2	0.731	0.011
D-H2	7	3	1000	4	2	0.731	0.010
D-H3	10	5	1000	4	2	0.731	0.014
Total							***0.87***

[1] Maximum firing duty per NSR Permit 0633-M12R2

[2] Startup CO concentration based on a similar calculation for a Western facility, permitted under TCEQ

[3] Provided by Western as response to SSM data request on 12/2/2011

[4] Startup CO Emission Factor = $\frac{1000\ \text{ppmv}}{} \times \frac{1}{1368} \frac{\text{lb/MMBtu}}{\text{ppmv}}$

The 1368 ppmv/ (lb/MMBtu) conversion factor was obtained from the following website:
http://www.johnsonburners.com/resourceeng/Emission%20Conversion%20Factors.pdf

Annual Emissions: $\frac{0.731\ \text{lb}}{\text{MMBtu}} \times \frac{26\ \text{MMBtu}}{\text{hr}} \times \frac{4\ \text{hrs}}{\text{startup}} \times \frac{2\ \text{startups}}{\text{yr}} \times \frac{\text{ton}}{2{,}000\ \text{lbs}} = \frac{0.076\ \text{ton}}{\text{yr}}$

Section 6.a

Green House Gas Emissions

(Submitting under 20.2.70, 20.2.72 20.2.74 NMAC)

Title V (20.2.70 NMAC), Minor NSR (20.2.72 NMAC), and PSD (20.2.74 NMAC) applicants must estimate and report greenhouse gas (GHG) emissions to verify the emission rates reported in the public notice, determine applicability to 40 CFR 60 Subparts, and to evaluate Prevention of Significant Deterioration (PSD) applicability. GHG emissions that are subject to air permit regulations consist of the sum of an aggregate group of these six greenhouse gases: carbon dioxide (CO_2), nitrous oxide (N_2O), methane (CH_4), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6).

Calculating GHG Emissions:

1. Calculate the ton per year (tpy) GHG mass emissions and GHG CO_2e emissions from your facility.
2. GHG mass emissions are the sum of the total annual tons of greenhouse gases without adjusting with the global warming potentials (GWPs). GHG CO_2e emissions are the sum of the mass emissions of each individual GHG multiplied by its GWP found in Table A-1 in 40 CFR 98 Mandatory Greenhouse Gas Reporting.
3. Emissions from routine or predictable start up, shut down, and maintenance must be included.
4. Report GHG mass and GHG CO_2e emissions in Table 2-P of this application. Emissions are reported in **short** tons per year and represent each emission unit's Potential to Emit (PTE).
5. All Title V major sources, PSD major sources, and all power plants, whether major or not, must calculate and report GHG mass and CO2e emissions for each unit in Table 2-P.
6. For minor source facilities that are not power plants, are not Title V, and are not PSD there are three options for reporting GHGs in Table 2-P: 1) report GHGs for each individual piece of equipment; 2) report all GHGs from a group of unit types, for example report all combustion source GHGs as a single unit and all venting GHGs as a second separate unit; 3) or check the following ☐ By checking this box, the applicant acknowledges the total CO2e emissions are less than 75,000 tons per year.

Sources for Calculating GHG Emissions:

- Manufacturer's Data
- AP-42 Compilation of Air Pollutant Emission Factors at http://www.epa.gov/ttn/chief/ap42/index.html
- EPA's Internet emission factor database WebFIRE at http://cfpub.epa.gov/webfire/
- 40 CFR 98 Mandatory Green House Gas Reporting except that tons should be reported in short tons rather than in metric tons for the purpose of PSD applicability.
- API Compendium of Greenhouse Gas Emissions Methodologies for the Oil and Natural Gas Industry. August 2009 or most recent version.
- Sources listed on EPA's NSR Resources for Estimating GHG Emissions at http://www.epa.gov/nsr/clean-air-act-permitting-greenhouse-gases:

Global Warming Potentials (GWP):
Applicants must use the Global Warming Potentials codified in Table A-1 of the most recent version of 40 CFR 98 Mandatory Greenhouse Gas Reporting. The GWP for a particular GHG is the ratio of heat trapped by one unit mass of the GHG to that of one unit mass of CO_2 over a specified time period.

"Greenhouse gas" for the purpose of air permit regulations is defined as the aggregate group of the following six gases: carbon dioxide, nitrous oxide, methane, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. **(20.2.70.7 NMAC, 20.2.74.7 NMAC).** You may also find GHGs defined in 40 CFR 86.1818-12(a).

Metric to Short Ton Conversion:
Short tons for GHGs and other regulated pollutants are the standard unit of measure for PSD and title V permitting programs. 40 CFR 98 Mandatory Greenhouse Reporting requires metric tons.
1 metric ton = 1.10231 short tons (per Table A-2 to Subpart A of Part 98 – Units of Measure Conversions)

There are no proposed changes to GHG emission in this application.

Site-Wide GHG Emission Calculation

Subpart/Description/Unit		GHG Emissions (tons)			
		CO_2	CH_4	N_20	Total CO_2e
Subpart C - General Stationary Combustion					
Natural Gas Sources (unit GP-NG)					
	Aggregated natural gas burning units	341,531.9	6.44	0.644	341,884.7
Refinery Fuel Gas Sources (unit GP-RFG)					
	Aggregated refinery fuel gas burning units	274,220.8	16.74	3.350	275,637.7
	Total Subpart C	**615,752.7**	**23.18**	**3.994**	**617,522.4**
Subpart Y - Petroleum Refineries					
Flare (unit FL-1)					
	Main Flare	47,637.5	143.79	0.476	51,374.3
Catalytic Cracking Units (unit FCCU)					
	FCCU	103,569.4	3.03	0.606	103,825.9
Sulfur Recovery Plants (units Sulferox SRU and SWAATS SRU)					
	Sulferox SRU	108.9	0.0	0.0	108.9
	SWAATS SRU	364.6	0.0	0.0	364.6
Equipment Leaks					
	Facility Equipment Leaks	0.0	14.33	0.0	358.3
Storage Tanks					
	Facility Storage Tanks	0.0	1.22	0.0	30.6
Loading Operations					
	Crude Railcars	0.0	0.03	0.0	0.80
	Total Subpart Y	**151,680.5**	**162.4**	**1.08**	**156,063.4**
Facility Total GHG Emissions (tons/yr)		**767,433.2**	**185.6**	**5.1**	**773,585.8**
Facility Total GHG Emissions (tonnes/yr)		**696,203.9**	**168.4**	**4.6**	**701,785.4**

Natural Gas Sources

All units combusting NG

Subpart C, Tier 2 Source
Use Equation C-2a

$$CO_2 = 1\,x\,10^{-3} * Fuel * HHV * EF \qquad \text{(Eq. C-2a)}$$

$$\mathrm{CH_4 \text{ or } N_2O} = 1\,x\,10^{-3} * \mathrm{HHV} * \mathrm{EF} * \mathrm{Fuel} \qquad \text{(Eq. C-9a)}$$

Reporting Requirements

Group ID: GP-NG
See List of Units for individual unit IDs and heat inputs
Fuel type: Natural Gas (only)
Tier: Tier 2

Inputs and Constants

Constants	Constant Description	Value	Units	Origin
1×10^{-3}	Conversion factor from kg to metric tons	1.00E-03	kg/m tons	Provided in Equation C-2a (Rule)
EF_{CO2}	CO2 Emission Factor	53.06	kg CO2/mmbtu	Table C-1
EF_{CH4}	CH4 Emission Factor	1.00E-03	kg CH4/mmbtu	Table C-2
EF_{N2O}	N2O Emission Factor	1.00E-04	kg N2O/mmbtu	Table C-2
GWP_{CH4}	Methane Global Warming Potential	25	mtons CO2e/mtons	Provided in Table A-1 (Rule)
GWP_{N2O}	Nitrous Oxide Globale Warming Potential	298	mtons CO2e/mtons	Provided in Table A-1 (Rule)

Variable	Variable Description	Value	Units	
Fuel	Annual Volume of Gaseous Fuel Combusted	5,614,700,000.00	scf	Total permitted natural gas fuel usage
HHV	Annual Average High Heating Value	1,040.000	btu/scf	Based on 2014 GHG Emission Calculation

Results	Result Description	Value	Units	Calculated fom
CO2	Total Annual Carbon Dioxide Emissions	309,832.6	m tons CO2	Equation C-2a
CH4	Total Annual Methane Emissions	5.84	m tons CH4	Equation C-9a
N2O	Total Annual Nitrous Oxide Emissions	0.584	m tons N2O	Equation C-9a

CO2e Results	Result Description	Value	Units	Calculated fom
CO2e	Total Annual CO2e Emissions	310,152.6	m tons CO2e	Equation A-1

Fuel Gas Mix Drum
V89-Z05

Subpart C, Tier 3 Source

$$CO_2 = \frac{44}{12} * Fuel * CC * \frac{MW}{MVC} * 0.001 \qquad \text{(Eq. C-5)}$$

$$CH_4 \text{ or } N_2O = 1 \times 10^{-3} * Fuel * HHV * EF \qquad \text{(Eq. C-8)}$$

Reporting Requirements

Group ID: GP-RFG

See *Unit List* tab for unit ID and heat inputs

Fuel Type: Refinery Fuel Gas

Tier Used: Tier 3

Inputs and Constants

Constants	Constant Description	Value	Units	Origin
MVC	Molar Volume Conversion Factor	849.5	scf/kg-mol	Provided in Equation C-5 (Rule)
44/12	Ratio of Molecular Weights, CO2 to C	3.7	(unitless)	Provided in Equation C-5 (Rule)
0.001	Conversion factor from kg to metric tons	0.0	kg/m tons	Provided in Equation C-5 (Rule)
EF_{CH4}	CH4 Emission Factor	3.00E-03	kg CH4/mmbtu	Table C-2 (Petroleum)
EF_{N2O}	N2O Emission Factor	6.00E-04	kg N2O/mmbtu	Table C-2 (Petroleum)
GWP_{CH4}	Methane Global Warming Potential	25.0	mtons CO2e/mtons	Provided in Table A-1 (Rule)
GWP_{N2O}	Nitrous Oxide Global Warming Potential	298.0	mtons CO2e/mtons	Provided in Table A-1 (Rule)

Variable	Variable Description	Value	Units	Calculated fom
Fuel	Total Fuel Gas to Gallup RFG Units	5,844,100,000.0	scf	Total permitted fuel gas usage
CC	Annual Average Carbon Content	0.69	kg C/kg-mol gas	2014 Monthly Data
MW	Annual Average Molecular Weight	14.3	kg/kg-mol gas	2014 Monthly Data
HHV	Annual Average High Heat Value	866.7	btu/scf	2014 Monthly Data

Results	Results Description	Value	Units	Calculated fom
CO2	Total Annual Carbon Dioxide Emissions	248,769.0	m tons CO2	Equation C-5
CH4	Total Annual Methane Emissions	15.19	m tons CH4	Equation C-8
N2O	Total Annual Nitrous Oxide Emissions	3.039	m tons N2O	Equation C-8

CO2e Results	Result Description	Value	Units	Calculated fom
CO2e	Total Annual CO2e Emissions from RFG Combustion	250,054.4	m tons CO2	Equation A-1

Process Flare - GHG Emission Calculation

44/12	Ratio of Molecular Weights, CO2 to C	3.67	(unitless)	Provided in Equation Y-1 (Rule)
0.001	Conversion factor from kg to metric tons	0.0010	metric tons/kg	Provided in Equation Y-1 (Rule)
0.98	Assumed combustion efficiency of a flare	0.98	$lb_{combusted}/lb_{flared}$	Provided in Equation Y-1 (Rule)
EmF	Default Emission Factor for CO2	60	kg/mmbtu	Provided in Equation Y-4 and Y-5 (Rule)
EmF_{CH4}	Default CH4 Emission Factor for Petr. Prods	3.0E-03	kg/mmbtu	Provided in Table C-2 (Rule)
0.02/0.98	Correction factor for flare combustion	0.02	$lb_{slip}/lb_{combusted}$	Provided in Equation Y-4 (Rule)
16/44	Correction factor for MWs of CH4 to CO2	0.36	(unitless)	Provided in Equation Y-4 (Rule)
f_{CH4}	Weight fraction C in the flare prior to combustion	0.4	kgC_{CH4}/kgC_{flare}	Provided in Equation Y-4 (Rule)
EmF_{N2O}	Default N2O emission factor for Petr. Prods	6.0E-04	kg/mmbtu	Provided in Table C-2 (Rule)
MW_C	Molecular weight of carbon (elemental)	12.011	kg/kg-mol	ASTM Standard Designation D 3588-98 (Reapproved 2003)
GWP_{CH4}	Methane Global Warming Potential	25	mtons CO2e/mtons	Provided in Table A-1 (Rule)
GWP_{N2O}	Nitrous Oxide Global Warming Potential	298	mtons CO2e/mtons	Provided in Table A-1 (Rule)
$Flare_{Norm}$	Volume of flare gas combusted during normal operation	697,054,025	scf/year	Per 2014 PI data for the flare's flow rates. A 15% safety factor was applied to the 2014 total fuel usage.
HHV	Higher heating value for fuel gas or flare gas	1,054	Btu/scf	This value was obtained by taking the average higher heating value of the flare gas during the months of April to December 2014 from the refinery's PI data. The heating values for each month were calculated using the contributions from the different flare gas components and their individual heating values.

CO_2	Total Annual CO_2 from Flaring	43,216.0	m tons CO_2	Equation Y-3, 40 CFR 98.253 (b) (1) (iii) (C)
CH_4	Total Annual CH_4 from Flaring	130.4	m tons CH_4	Equation Y-4, 40 CFR 98.253 (b) (2)
N_2O	Total Annual N_2O from Flaring	0.43	m tons N_2O	Equation Y-5, 40 CFR 98.253 (b) (3)
CO_2e	Total Annual CO_2e Emissions	46,606.0	m tons CO_2e	Equation A-1, 40 CFR 98.2 (b) (4)

FCCU

Subpart Y, Section (c)
Use Equations Y-6, Y-7a, Y-9 and Y-10

Reporting Requirements

Unit ID:	FCCU
Type:	Fluidized Catalytic Cracking Unit (<10,000 bpd)
Mx. Thrpt:	8500 bbl/day
Equation:	Y-6 and Y-7a (for CO_2, with daily averages)

See below for calculated emissions and method

Inputs and Constants

Constants	Constant Description	Value	Units	Origin
MVC	Molar Volume Conversion Factor	849.5	scf/kg-mol	Provided in Equation Y-7a (Rule)
		385.4	scf/lb-mol	Calculated from scf/kg-mol
79	Conversion factor	79	unitless	Provided in Equation Y-6 (Rule)
0.001	Conversion factor from kg to metric tons	0.001	kg/m tons	Provided in Equation Y-6 (Rule)
44	Molecular weight of CO2	44	kg/kg-mol	Provided in Equation Y-6 (Rule)
EmF_1	Default CO2 emission factor for petr. Coke	102.41	kg CO2/mmbtu	Provided in Table C-1 for Petroluem Coke (Rule)
EmF_2	Default CH4 emission factor for petr. products	3.0E-03	kg CH4/mmbtu	Provided in Table C-2 for Petroleum Products (Rule)
EmF_3	Default N2O emission factor for petr. products	6.0E-04	kg N2O/mmbtu	Provided in Table C-2 for Petroleum Products (Rule)
GWP_{CH4}	Methane Global Warming Potential	25	mtons CO2e/mtons	Provided in Table A-1 (Rule)
GWP_{N2O}	Nitrous Oxide Globale Warming Potential	298	mtons CO2e/mtons	Provided in Table A-1 (Rule)
RH	Assumed Relative Humidity	52.8	%	http://www.weatherreports.com; based on 2015 data
BP	Assumed Barometric Pressure	29.98	in Hg	http://www.wrcc.dri.edu
	Enriched Oxygen Flow to Regen	0	mscfh	
	Assumed average molecular weight of comb air	28.97	lb/lb-mol	Engineering Estimate

Current Values

Variable	Variable Description	Value	Units	
Q_r	Volumetric flow rate of exhaust gas from FCCU	1,108,994.45	dscfd	Based on 2015 data
$CO_{2out, avg}$	Annual average CO2 outlet concentration	16.94	% vol	
$CO_{out,avg}$	Annual average CO outlet concentration	1.14	% vol	
$O_{2,avg}$	Annual average O2 outlet concentration	1.83	% vol	
$Q_{r,avg}$	Annual average volumetric flow rate	1,108,994.45	dscfh	Based on 2015 data
$Q_{a,avg}$	Annual average inlet air flow	1,149,471.05	dscfh	Based on 2015 data

Results

Results	Results Description	Value	Units	
CO2	Total Annual CO2 from FCCU	93,956.6	m tons CO2	Added a 10% safety factor to the 2015 emissions
CH4	Total Annual CH4 from FCCU	2.75	m tons CH4	Added a 10% safety factor to the 2015 emissions
N2O	Total Annual N2O from FCCU	0.550	m tons N2O	Added a 10% safety factor to the 2015 emissions

Results	Results Description	Value	Units
CO2e	Total Annual CO2e from FCCU	94,189.3	m tons CO2e

Sulfur Recovery Unit

Sulferox SRU

Subpart Y, Section (f)

$$CO_2 = F_{SG} * \frac{44}{MVC} * MF_C * 0.001 \qquad \text{(Eq. Y-12)}$$

Reporting Requirements

Unit ID:	SulFerox SRU
Mx Thrpt:	2 tonnes per day Sulfur
Equation:	Y-12

Inputs and Constants

Constants	Constant Description	Value	Units	Origin
MF_C	Mole Fraction of Carbon in sour gas	0.20	none	Provided in Equation Y-12 (Rule)
MVC	Molar Volume Conversion Factor	849.5	scf/kg mol	Provided in Equation Y-12 (Rule)
44	Molecular weight of CO2	44	lb/lbmol	Provided in Equation Y-12 (Rule)
0.001	Molecular weight of C	0.001	kg/m tons	Provided in Equation Y-12 (Rule)

Variable	Variable Description	Value	Units	
F_{SG}	Volumetric Flow of Sour Gas Feed	9,534,846.8	scf	*A 10% safety factor was added to the 2014 Flow Data*

Results	Result Description	Value	Units	Calculated from
CO2	Total Annual Carbon Dioxide Emissions	98.8	m tons CO2	Equation Y-12

Sulfur Recovery Unit

SWAATS Unit

Subpart Y, Section (f)

$$CO_2 = F_{SG} * \frac{44}{MVC} * MF_C * 0.001 \qquad \text{(Eq. Y-12)}$$

Reporting Requirements

Unit ID:	SWAATS SRU
Mx Thrpt:	3 tonnes per day Sulfur (approximate)
Equation:	Y-12

Inputs and Constants

Constants	Constant Description	Value	Units	Origin
MF_C	Mole Fraction of Carbon in sour gas	0.20	none	Provided in Equation Y-12 (Rule)
MVC	Molar Volume Conversion Factor	849.5	scf/kg mol	Provided in Equation Y-12 (Rule)
44	Molecular weight of CO2	44	lb/lbmol	Provided in Equation Y-12 (Rule)
0.001	Molecular weight of C	0.001	kg/m tons	Provided in Equation Y-12 (Rule)

Variable	Variable Description	Value	Units	
F_{SG}	Volumetric Flow of Sour Gas Feed	31,933,582.6	scf	*A 10% safety factor was added to the 2011 Flow Data*

Results	Result Description	Value	Units	Calculated from
CO2	Total Annual Carbon Dioxide Emissions	330.8	m tons CO2	Equation Y-12

Equipment Leaks

Subpart Y, Section (l)

$$CH_4 = (0.4 \times N_{CD} + 0.2 \times N_{PU1} + 0.1 \times N_{PU2} + 4.3 \times N_{H2} + 6 \times N_{FGS}) \quad \text{(Eq. Y-21)}$$

Reporting Requirements

Equation: Y-21

See below for unit counts

Inputs and Constants

Constants	Constant Description	Value	Units	Origin
N_{CD}	Number of atmospheric crude distillation columns	1	units	Provided by WNR Environmental*
N_{PU1}	Number of catalytic cracking, coking and hydrocracking	1	units	Provided by WNR Environmental*
	Number of full-range distillation columns	10	units	See *Equipment Leaks Emissions*
N_{PU2}	Number of hydrotreating/hydrorefining, cat reforming and visbreaking	1	units	Provided by WNR Environmental*
N_{H2}	Number of hydrogen plants	1	units	Provided by WNR Environmental*
N_{FGS}	Number of fuel gas systems	1	units	Provided by WNR Environmental*
GWP_{CH4}	Methane Global Warming Potential	25	mtons CO2e/CH4	Provided in Table A-1 (Rule)

Results	Result Description	Value	Units	Calculated from
CH4	Total Annual Methane Emissions	13.00	m tons CH4	Equation Y-21

CO2e Results	Result Description	Value	Units	Calculated from
CO2e	Total Annual CO2e Emissions	325.0	m tons CO2e	Equation A-1

Notes

All counts are obtained from WNR El Paso engineering/environmental staff.

N_{PU1} contains the columns addressed in the previous tab (*Equipment Leaks Documentation*) and one FCCU.

Storage Tanks

Subpart Y, Section (m)

$$CH_4 = \left(0.1 \times Q_{Ref}\right) \qquad \text{(Eq. Y-22)}$$

Reporting Requirements

No *unstabilized crude* processed at the site

Inputs and Constants

Constants	Constant Description	Value	Units	Origin
0.1	Default Emission Factor for storage tanks	0.1	mtons CH4/MMbbl	Provided in Equation Y-22 (Rule)
GWP_{CH4}	Methane Global Warming Potential	25	mtons CO2e/mtons	Provided in Table A-1 (Rule)

Variable	Variable Description	Value	Units	Origin
Q_{Ref}	Quantity of crude and int. processed	11.1	MMbbl	A 20% safety factor was added to the 2014 Yield

Results	Result Description	Value	Units	Calculated fom
CH4	Total Annual CH4 Emissions	1.11	m tons CH4	Equation Y-22

CO2e Results	Result Description	Value	Units	Calculated fom
CO2e	Total Annual CO2e Emissions	27.8	m tons CO2e	Equation A-1

Loading Operations

Subpart Y, Section (n)

$$L_L = 12.46 \frac{SPM}{T} \quad (1)$$

where:

L_L = loading loss, pounds per 1000 gallons (lb/10^3 gal) of liquid loaded

S = a saturation factor (see Table 5.2-1)
P = true vapor pressure of liquid loaded, pounds per square inch absolute (psia) (see Section 7.1, "Organic Liquid Storage Tanks")
M = molecular weight of vapors, pounds per pound-mole (lb/lb-mole) (see Section 7.1, "Organic Liquid Storage Tanks")
T = temperature of bulk liquid loaded, °R (°F + 460)

Reporting Requirements

Unit ID:	Crude Loading
Type:	Other
Equation:	AP-42, Section 5.2

See below for emissions calculation and methods

Inputs and Constants

Constants	Constant Description	Value	Units	Origin
0.001	Conversion, kg to mtons	0.001	kg/m tons	Provided in Equation Y-19 (Rule)
42	Conversion, bbl to gal	42	gal/bbl	
MF_{CH4}	Mole Fraction of Methane	15%	wt%	Footnote (a), AP-42, Section 5.2, Table 5.2-5, Assumed all CH4 (no ethane)
GWP_{CH4}	Methane Global Warming Potential	25	mtons CO2e/mtons	Provided in Table A-1 (Rule)
S	Saturation Factor	1		For submerged fill railcars, vapor balance service
P	True Vapor Pressure	2.8	psia	Crude Oil RVP 5, per AP-42 Table 7.1-2
M	Molecular Weight of Vapors	50	lb/lbmol	Crude Oil RVP 5, per AP-42 Table 7.1-2
T	Bulk Liquid Temperature	60	F	Assumed
L_L	Rail and Truck Loading Loss, TOC	3.35	lb organic/10^3 gal	AP-42, Section 5.2, Equation 1 (above)

Inputs	Input Description	Value	Units	
Rail Crude	Total Crude Unloaded from Railcars	3,606	bbls	*Per 2015 data, with a 100% safety factor*

Calculations	Description	Value	Units	
	Total Crude Unloaded from Rail	151,452	gal	
	Total Organic Emission	507	lbs TOC	*See equation above*
	Total Methane Emissions	76	lbs CH4	

Result	Result Description	Value	Units	Calculated fom
CH4	Total Annual CH4 Emissions	0.030	m tons CH4	Equation Y-9

CO2e Result	Result Description	Value	Units	Calculated fom
CO2e	Total Annual CO2e Emissions	0.80	m tons CO2e	Equation A-1

Section 7

Information Used To Determine Emissions

Information Used to Determine Emissions shall include the following:

- ☐ If manufacturer data are used, include specifications for emissions units and control equipment, including control efficiencies specifications and sufficient engineering data for verification of control equipment operation, including design drawings, test reports, and design parameters that affect normal operation.
- ☑ If test data are used, include a copy of the complete test report. If the test data are for an emissions unit other than the one being permitted, the emission units must be identical. Test data may not be used if any difference in operating conditions of the unit being permitted and the unit represented in the test report significantly effect emission rates.
- ☐ If the most current copy of AP-42 is used, reference the section and date located at the bottom of the page. Include a copy of the page containing the emissions factors, and clearly mark the factors used in the calculations.
- ☐ If an older version of AP-42 is used, include a complete copy of the section.
- ☐ If an EPA document or other material is referenced, include a complete copy.
- ☐ Fuel specifications sheet.
- ☐ If computer models are used to estimate emissions, include an input summary (if available) and a detailed report, and a disk containing the input file(s) used to run the model. For tank-flashing emissions, include a discussion of the method used to estimate tank-flashing emissions, relative thresholds (i.e., permit or major source (NSPS, PSD or Title V)), accuracy of the model, the input and output from simulation models and software, all calculations, documentation of any assumptions used, descriptions of sampling methods and conditions, copies of any lab sample analysis.

The following information, as reproduced from previous NSR applications, is included:

NSR Permit 0633-M17 (not yet issued)

- 2018 FCCU Stack Testing Report & ESP Voltage Data
- Zevenhoven & Kilpinen, 2001
- Nazaroff & Alvarez-Cohen, 2001

NSR Permit 0633-M16/M16R1

Fugitives components added to FCCU and NHT Units (part of the plant wide unit FUG-R)
- LeakDAS Equation Set Details Report, June 6, 2018
- EPA Protocol for Equipment Leak Emission Estimates, 1995

ThioSolv SWAATS Unit (units TV-1 and TV-1 (SSM))
- Vent gas overhead stream properties

Storage Tanks (units T-574 and T-576; permitted under unit TK-R)
- Trinity Tank Emissions Calculation Tool

NSR Permit 0633-M15

Gascon compressor engines (units G-C1A, G-C1B, G-C1C)
- 2016 and 2017 stack testing data

Plat compressor engine (unit P-C1B)
- 2015, 2016, and 2017 stack testing data

Portable Emission Control system (unit PECS)
- Design basis for unit PECS sent by Western to John Zink
- Actual loading information during 2016 VRU maintenance event
- John Zink proposal for PECS unit

Diesel-fired generator (unit GEN-1)
- Manufacturer emission factors
- AP-42, Table 3.3-2, "Gasoline And Diesel Industrial Engines" (10/96)
- 40 CFR 98, Subpart C, Tables C-1 and C-2

Backup diesel-fired air compressor (unit AC-12)
- Engine emissions data
- AP-42, Table 3.3-2, "Gasoline And Diesel Industrial Engines" (10/96)
- CARB emission factors for Diesel engines

Fluid Catalytic Cracking Unit (unit ESP)
- 2014 CEMS data (for average flowrate determination)
- 2017 NOx CEMS data
- 2016 and 2017 CO CEMS data
- 2016 and 2017 SO2 CEMS data
- 2017 Air Blower data
- 2016 and 2017 stack test data for PM
- 2016 and 2017 coke burn rates

Heater/Boiler Startup
- CO CEMS data, El Paso Refinery

NSR Permit 0633-M14R3
- Firewater pumps (FW-1/2) Cat C18 ACERT engine specifications

In addition, the following previous Title V applications are included electronically only:
- Significant Modification to Title V Permit P021-R2M2 (March 23, 2016)
- Update to Title V Renewal Application for P021-R1M1 (October 29, 2014)
- Title V Renewal Application for P021-R1-M1 (July 26, 2013)

No comment

C18 ACERT™ Petroleum Engine

Tier 4 Final

563 & 597 bkW/755 & 800 bhp @ 1800 rpm

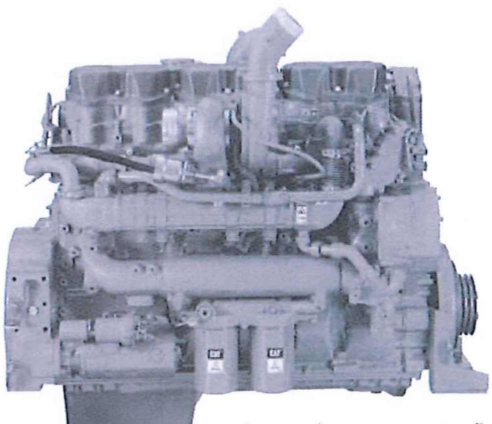


Image shown may not reflect actual engine configuration

CAT® ENGINE SPECIFICATIONS

I-6, 4-Stroke-Cycle Diesel

Emissions	U.S. EPA Tier 4 Final
Peak Torque at Speed	3710 N•m (2736 lb-ft) @ 1300 rpm*
Bore	145 mm (5.7 in)
Stroke	183 mm (7.2 in)
Displacement	18.1 L (1104.5 in^3)
Aspiration	Turbocharged-Aftercooled
Governor and Protection	Electronic ADEM™ A4
Engine Weight, Net Dry (approximate)	1580 kg (3482 lbs)
Capacity for Liquids	
Lube Oil System (refill)	40-74 L (42.3-78 U.S. qts)
Cooling System	26.9 L (28.4 U.S. qts)
Oil Change Interval	250-500 hours
Rotation (from flywheel end)	Counterclockwise
Flywheel and Flywheel Housing	SAE No. 0 or SAE No. 1
Flywheel Teeth	136 (SAE 0), 113 (SAE 1)

*D-rating

FEATURES

Emissions
- Designed to meet U.S. EPA Tier 4 Final emissions requirements.
- On-engine NOx reduction system with optimized piston, ring, liner, and fuel system configuration to reduce NOx while minimizing in-cylinder sooting
- Aftertreatment features diesel oxidation catalyst
- Meets Tier 4 Final emissions requirements four years early, achieving environmental benefits earlier than required

Engine Design
- Proven reliability and durability
- Broad operating speed range
- High power density
- PTO drive options provide flexible access to auxiliary power for pumps and other needs

Low Total Cost of Ownership
- Maintenance-free aftertreatment
- Optimized fuel consumption
- 250- to 500-hour oil change intervals enable low maintenance costs

Advanced Digital Engine Management

ADEM A4 control system providing integrated ignition, speed governing, protection, and controls, including detonation-sensitive variable ignition timing. ADEM A4 has improved: user interface, display system, shutdown controls, and system diagnostics.

Custom Packaging

For any petroleum application, trust Caterpillar to meet your exact needs with a factory custom package. Cat engines, generators, enclosures, controls, radiators, transmissions, aftertreatment solutions — anything your project requires — can be custom designed and matched to create a one-of-a kind solution. Custom packages are globally supported and are covered by a one-year warranty after startup.

Fuel & Oil

Requires Ultra Low Sulfur Diesel (ULSD) containing a maximum of 15 ppm sulfur, and new oil formulations to support the new technology. Designed to accommodate B20 biofuel.

Transmissions
- Caterpillar has a full line of engine-transmission packages that can be fully integrated with your axle, hydraulics, and operator interface.
- C18 ACERT™ Caterpillar optimized transmission matches: CX35-P800

Product Support Offered Through Global Cat Dealer Network
- More than 2,200 dealer outlets
- Cat factory-trained dealer technicians service every aspect of your petroleum engine
- Cat parts and labor warranty

Preventive maintenance agreements available for repair-before-failure options

S•O•S℠ program matches your oil and coolant samples against Caterpillar set standards to determine:
- Internal engine component condition
- Presence of unwanted fluids
- Presence of combustion by-products
- Site-specific oil change interval

Over 80 Years of Engine Manufacturing Experience

Ownership of these manufacturing processes enables Caterpillar to produce high quality, dependable products.
- Cast engine blocks, heads, cylinder liners, and flywheel housings
- Machine critical components
- Assemble complete engine

Web Site

For all your petroleum power requirements, visit www.catoilandgas.cat.com.

STANDARD ENGINE EQUIPMENT

Air Inlet System
Turbocharged Aftercooled

Control System
Electronic control system, over-foam wiring harness, automatic altitude compensation, power compensated for fuel temperature, configurable software features, engine monitoring system SAE J1939 broadcast and control, integrated Electronic Control Unit (ECU) remote fan control

Cooling System
Vertical outlet thermostat housing, centrifugal water pump

Exhaust System
Dry exhaust manifold, Diesel Oxidation Catalyst (DOC)

Flywheels and Flywheel Housing
SAE 0 and SAE 1 flywheel housing

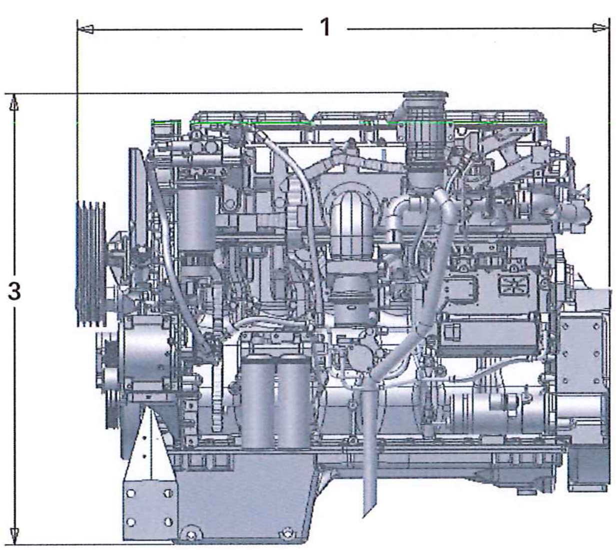
Fuel System
MEUI injection; primary fuel filter, secondary fuel filters, fuel transfer pump, electronic fuel priming

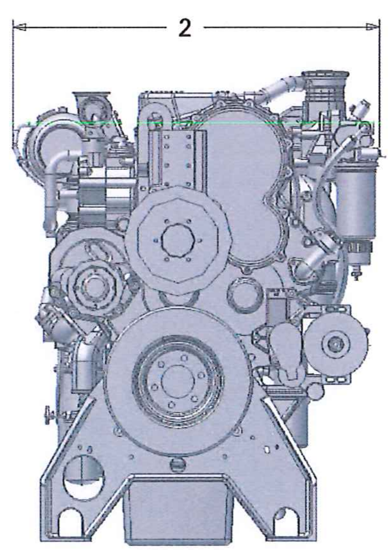
Lube System
Open crankcase ventilation system, oil cooler, oil filler, oil filter, oil dipstick, oil pump (gear driven), choice of sumps (front, rear, high-capacity center, and high-capacity front)

Power Take Off
SAE B and SAE C drives available, engine power can also be taken from the front of the engine on some applications

General
Paint: Cat yellow; vibration damper; lifting eyes

DIMENSIONS





(1) Length —1530.3 mm (60.2 in) (2) Width — 960.5 mm (37.8 in) (3) Height — 1281.9 mm (50.5 in)

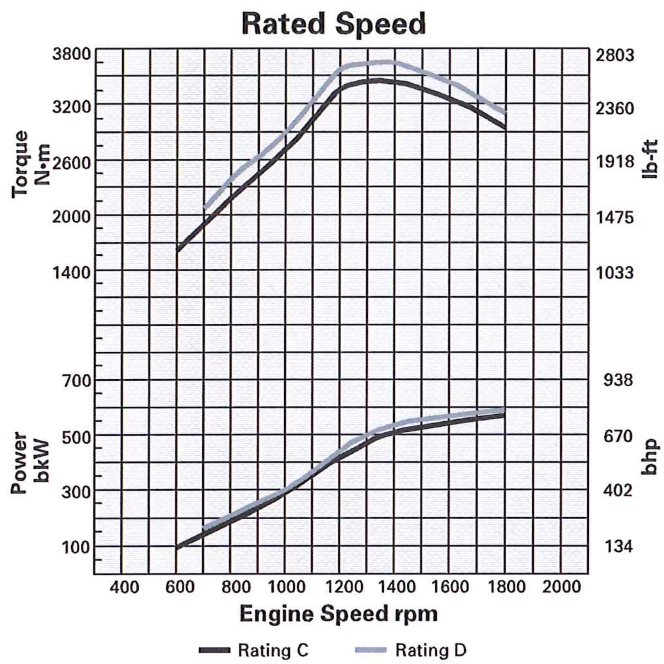
Note: Final dimensions dependent on selected options

CAT

C18 ACERT™
Petroleum Engine
Tier 4 Final
563 & 597 bkW/755 & 800 bhp @ 1800 rpm

PERFORMANCE DATA

Turbocharged-Aftercooled — 1800 rpm



	Peak Power			Peak Torque		
Rating	**Speed rpm**	**Peak Power bkW**	**Peak Power bhp**	**Speed rpm**	**Peak Torque N•m**	**Peak Torque lb-ft**
C	1800	563	755	1300	3503	2584
D	1800	597	800	1300	3710	2736

RATING DEFINITIONS AND CONDITIONS

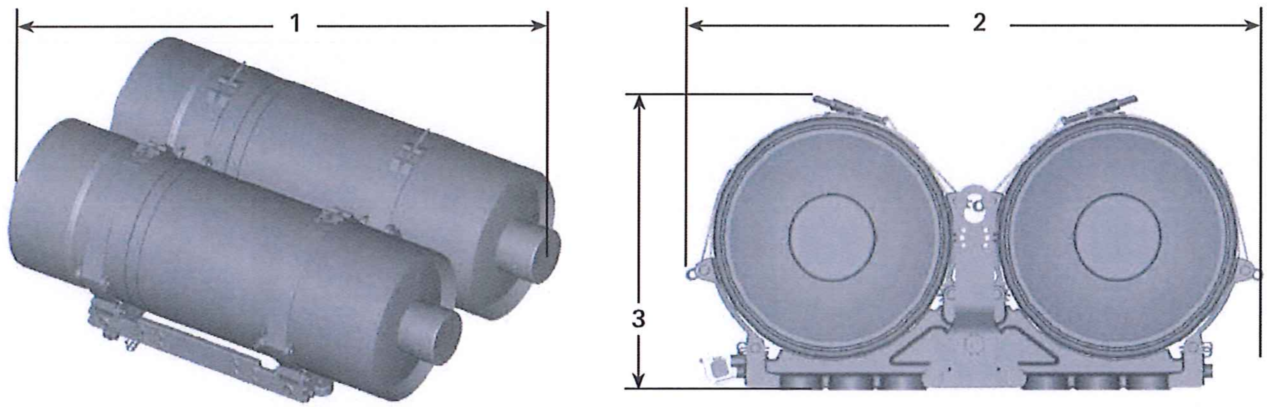
C Rating (Intermittent) service where maximum power and/or speed are cyclic (time at full load not to exceed 50%).

D Rating for service where maximum power is required for periodic overloads (time at full load not to exceed 10% of the duty cycle).

Engine Performance Diesel Engines — 7 liter and higher are based on SAE J1995, inlet air standard conditions of 99 kPa (29.31 in Hg) dry barometer and 25°C (77°F) temperature. Performance measured using a standard fuel with fuel gravity of 35° API having a lower heating value of 42 780 kJ/kg (18,390 btu/lb) when used at 29°C (84.2°F) with a density of 838.9 g/L.

C18 ACERT™
Petroleum Engine
Tier 4 Final
563 & 597 bkW/755 & 800 bhp @ 1800 rpm

AFTERTREATMENT CONFIGURATION



Images shown reflect side-by-side configuration with mounting structure (standard).

Approximate Size and Weight
(1) Length — 1162.5 mm (45.7 in)
(2) Width — 870.59 mm (34.3 in)
(3) Height — 439.2 mm (17.3 in)

Includes two diesel oxidation catalysts with mufflers, mounted side-by-side with supporting structure.

STANDARD EMISSIONS CONTROL EQUIPMENT

DOC: Diesel Oxidation Catalysts (2)

NRS: NOx Reduction System

LEHW0109-00 (12-10)

GOLDEN SPECIALTY

THE GOLD STANDARD FOR AIR TESTING

Air Quality Test Report

Annual Compliance Test Program for NO_x & CO

Western Refining Southwest

Gallup Refinery
Jamestown, New Mexico

Gas Compressors A, B and C

Title V Permit No.: P021-R2; Emission Unit Nos.: G-C1A, G-C1B, & G-C1C

Report Number: 160035
Date Tested: February 10 & 11, 2016
Date Prepared: March 1, 2016

PREPARED FOR
Mr. Ed Riege,
Environmental Manager
Western Refining Southwest
Gallup Refinery
I-40 @ Exit 39
Jamestown, NM 87347

Phone 505.722.0217

Prepared by:
GOLDEN SPECIALTY, INC.
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(844.346.5336)
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Air Quality Test Report

Annual Compliance Test Program for NO_x & CO

Western Refining Southwest
Gallup Refinery
Jamestown, New Mexico

Gas Compressors A, B and C

This report is supported by GOLDEN's Quality Assurance Manual. The information included in the report is authentic and accurate, and GOLDEN operated in conformance with ASTM D7036 to the best of our knowledge during this test program.

Certified by:

Troy M. Burrows, QSTO 2008-113
Chief Operating Officer

Reviewed by for

Larry E. Cottone, QSTI 2007-074
Regional Division Manager / Onsite QSTI

TABLE OF CONTENTS

GOLDEN SPECIALTY

Air Quality Test Report

EXECUTIVE SUMMARY

Golden Specialty, Inc.'s (GOLDEN) Southwest Regional Office was contracted by Western Refining Southwest (WNR) to perform emissions testing at their Gallup Refinery located in Jamestown, New Mexico. Testing was conducted on February 10 and 11, 2016. GOLDEN was contracted to perform annual compliance testing for nitrogen oxides (NO_x) and carbon monoxide (CO) on the exhausts of Gas Compressors A, B, and C, referred to by the refinery as GasCon Compressors A, B and C, respectively. Additional measurements were made for the determination of volumetric flow rates, oxygen (O_2), carbon dioxide (CO_2), and moisture. The test was conducted in accordance with all appropriate United States Environmental Protection Agency (USEPA) Methodologies; as well as all applicable New Mexico Environment Department (NMED) Air Quality Bureau requirements outlined in the facility's Title V Permit No. P021-R2 and Title 40 Code of Federal Regulations (CFR) Part 63, Subpart ZZZZ, Sections 63.6610, 63.6612, 63.6620, 63.6640, and Table 4.

Testing consisted of three (3) one-hour runs on each compressor performed in accordance with USEPA Methods 1, 2, 3A, 4, 7E, and 10. Testing and analysis procedures used for this project are presented in the United States Environmental Protection Agency (USEPA) document Title 40, Code of Federal Regulations, Part 60 (40 CFR 60), Appendix A, and on the USEPA Technology Transfer Network Emission Measurement Center (EPA-TTN-EMC) website, Test Methods Section (http://www.epa.gov/ttn/emc/). Included in this test report are sections detailing the Test Program, including Executive Summary, Introduction, Test Results, Sampling Procedures, Source Information, and Sample Calculation Sections; with Appendices which include all resumes of key personnel, calibrations, field data, reference method data, and process data.

Provided in Tables 1 through 3 are the summaries of results for GasCon Compressors A, B and C, respectively.

Run Number	1	2	3	Measured Average	Compliance Limit
Compliance Test Date	2/11/2016	2/11/2016	2/11/2016		
Compliance Run Start Time	15:15	16:16	17:18		
Compliance Run Finish Time	16:15	17:16	18:18		
Carbon Dioxide, % vd	6.70	6.78	6.67	6.72	
Oxygen, % vd	9.06	9.00	9.11	9.06	
Moisture Content of the Stack Gas, %	12.99	11.61	12.45	12.35	
Dry Stack Volumetric Flow Rate, dry scfm	766.1	783.2	793.0	780.8	
Nitrogen Oxides Concentration, ppmvd	2,708.7	2,771.1	2,605.1	2,695.0	
Nitrogen Oxides Concentration, ppmvd @ 15% O_2	1,350.2	1,374.3	1,303.3	1,342.6	
Nitrogen Oxides Emission Rate, lb/hr	14.86	15.54	14.79	15.07	*17.4*
Nitrogen Oxides Emission Rate, tons/yr	65.09	68.08	64.80	65.99	*76.2*
Carbon Monoxide Concentration, ppmvd	4.37	4.04	4.06	4.16	
Carbon Monoxide Concentration, ppmvd @ 15% O_2	2.18	2.00	2.03	2.07	
Carbon Monoxide Emission Rate, lb/hr	0.0146	0.0138	0.0140	0.0141	*8.5*
Carbon Monoxide Emission Rate, tons/yr	0.064	0.060	0.061	0.062	*37.2*

Table 1. Summary of Gas Compressor A Testing – February 11, 2016

Run Number	1	2	3	Measured Average	Compliance Limit
Compliance Test Date	2/11/2016	2/11/2016	2/11/2016		
Compliance Run Start Time	8:44	9:45	10:47		
Compliance Run Finish Time	9:44	10:45	11:47		
Carbon Dioxide, % vd	6.72	6.93	7.04	6.90	
Oxygen, % vd	9.17	8.83	8.42	8.80	
Moisture Content of the Stack Gas, %	10.58	11.80	13.36	11.91	
Dry Stack Volumetric Flow Rate, dry scfm	820.8	791.9	743.4	785.3	
Nitrogen Oxides Concentration, ppmvd	1,842.8	2,309.9	3,008.6	2,387.1	
Nitrogen Oxides Concentration, ppmvd @ 15% O_2	926.7	1,129.2	1,422.0	1,159.3	
Nitrogen Oxides Emission Rate, lb/hr	10.83	13.10	16.02	13.32	*17.4*
Nitrogen Oxides Emission Rate, tons/yr	47.44	57.38	70.15	58.32	*76.2*
Carbon Monoxide Concentration, ppmvd	2.83	2.34	1.76	2.31	
Carbon Monoxide Concentration, ppmvd @ 15% O_2	1.42	1.15	0.83	1.13	
Carbon Monoxide Emission Rate, lb/hr	0.0101	0.0081	0.0057	0.0080	*8.5*
Carbon Monoxide Emission Rate, tons/yr	0.044	0.035	0.025	0.035	*37.2*

Table 2. Summary of Gas Compressor B Testing – February 11, 2016

Run Number	1	2	3	Measured Average	Compliance Limit
Compliance Test Date	2/10/2016	2/10/2016	2/10/2016		
Compliance Run Start Time	15:04	16:08	17:10		
Compliance Run Finish Time	16:04	17:08	18:10		
Carbon Dioxide, % vd	6.19	6.26	6.22	6.22	
Oxygen, % vd	9.97	9.90	9.81	9.89	
Moisture Content of the Stack Gas, %	10.47	9.99	11.64	10.70	
Dry Stack Volumetric Flow Rate, dry scfm	867.8	861.7	849.9	859.8	
Nitrogen Oxides Concentration, ppmvd	2,409.6	2,446.4	2,513.2	2,456.4	
Nitrogen Oxides Concentration, ppmvd @ 15% O_2	1,301.1	1,311.9	1,336.6	1,316.5	
Nitrogen Oxides Emission Rate, lb/hr	14.97	15.10	15.30	15.12	*17.4*
Nitrogen Oxides Emission Rate, tons/yr	65.59	66.12	67.00	66.24	*76.2*
Carbon Monoxide Concentration, ppmvd	5.98	6.23	6.10	6.11	
Carbon Monoxide Concentration, ppmvd @ 15% O_2	3.23	3.34	3.24	3.27	
Carbon Monoxide Emission Rate, lb/hr	0.023	0.023	0.023	0.023	*8.5*
Carbon Monoxide Emission Rate, tons/yr	0.099	0.103	0.099	0.100	*37.2*

Table 3. Summary of Gas Compressor C Testing – February 10, 2016

GOLDEN SPECIALTY

THE GOLD STANDARD FOR AIR TESTING

Air Quality Test Report

Annual Compliance Test Program for NO_x & CO

Western Refining Southwest

Gallup Refinery
Jamestown, New Mexico

Gas Compressors B and C

Title V Permit No.: P021-R2-M1; Emission Unit Nos.: G-C1B, & G-C1C

Report Number: 170007-A
Date Tested: March 2, 2017
Date Prepared: March 30, 2017

PREPARED FOR
Ms. Loretta Morgan,
Environmental Specialist
Western Refining Southwest
Gallup Refinery
I-40 @ Exit 39
Jamestown, NM 87347

Phone 505.722.0242

Prepared by:
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(844.346.5336)
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Air Quality Test Report

Annual Compliance Test Program for NO_x & CO

Western Refining Southwest
Gallup Refinery
Jamestown, New Mexico

Gas Compressors B and C

This report is supported by GOLDEN's Quality Assurance Manual. The information included in the report is authentic and accurate, and GOLDEN operated in conformance with ASTM D7036 to the best of our knowledge during this test program.

Certified by:

Scott B. Swiggard, Ph.D., QSTI 2006-025
Technical Director

Shamit Nakra, Ph.D., QI (Groups I-IV)
Project Manager / Onsite QI

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GOLDEN SPECIALTY

Air Quality Test Report

EXECUTIVE SUMMARY

Golden Specialty, Inc.'s (GOLDEN) Southwest Regional Office was contracted by Western Refining Southwest (WNR) to perform emissions testing at their Gallup Refinery located in Jamestown, New Mexico. Testing was conducted on March 2, 2017. GOLDEN was contracted to perform annual compliance testing for nitrogen oxides (NO_x) and carbon monoxide (CO) on the exhausts of Gas Compressors B and C, referred to by the refinery as GasCon Compressors B and C, respectively. Additional measurements were made for the determination of volumetric flow rates, oxygen (O_2), carbon dioxide (CO_2), and moisture. The test was conducted in accordance with all appropriate United States Environmental Protection Agency (USEPA) Methodologies; as well as all applicable New Mexico Environment Department (NMED) Air Quality Bureau requirements outlined in the facility's Title V Permit No. P021-R2-M1 and Title 40 Code of Federal Regulations (CFR) Part 63, Subpart ZZZZ, Sections 63.6610, 63.6612, 63.6620, 63.6640, and Table 4.

Testing consisted of three (3) one-hour runs on each compressor performed in accordance with USEPA Methods 1, 2, 3A, 4, 7E, and 10. Testing and analysis procedures used for this project are presented in the United States Environmental Protection Agency (USEPA) document Title 40, Code of Federal Regulations, Part 60 (40 CFR 60), Appendix A, and on the USEPA Technology Transfer Network Emission Measurement Center (EPA-TTN-EMC) website, Test Methods Section (http://www.epa.gov/ttn/emc/). Included in this test report are sections detailing the Test Program, including Executive Summary, Introduction, Test Results, Sampling Procedures, Source Information, and Sample Calculation Sections; with Appendices which include all resumes of key personnel, calibrations, field data, reference method data, and process data.

Provided in Tables 1 and 2 are the summaries of results for GasCon Compressors B and C, respectively.

Run Number	1	2	3	Measured Average	Compliance Limit
Compliance Test Date	3/2/2017	3/2/2017	3/2/2017		
Compliance Run Start Time	14:10	15:13	16:14		
Compliance Run Finish Time	15:10	16:13	17:14		
Carbon Dioxide, % vd	5.36	5.34	5.40	5.37	
Oxygen, % vd	11.14	11.13	11.11	11.13	
Moisture Content of the Stack Gas, %	9.37	9.09	8.94	9.13	
Dry Stack Volumetric Flow Rate, dry scfm	830.8	834.5	835.3	833.5	
Nitrogen Oxides Concentration, ppmvd	1,466.2	1,483.9	1,494.1	1,481.4	
Nitrogen Oxides Concentration, ppmvd @ 15% O_2	886.3	896.4	900.3	894.4	
Nitrogen Oxides Emission Rate, lb/hr	8.72	8.87	8.94	8.84	*17.4*
Nitrogen Oxides Emission Rate, tons/yr	38.21	38.84	39.14	38.73	*76.2*
Carbon Monoxide Concentration, ppmvd	7.07	6.58	5.19	6.28	
Carbon Monoxide Concentration, ppmvd @ 15% O_2	4.27	3.98	3.13	3.79	
Carbon Monoxide Emission Rate, lb/hr	0.026	0.024	0.019	0.023	*8.5*
Carbon Monoxide Emission Rate, tons/yr	0.112	0.105	0.083	0.100	*37.2*

Table 1. Summary of Gas Compressor B Testing

GOLDEN SPECIALTY

Air Quality Test Report

Run Number	1	2	*3	Measured Average	Compliance Limit
Compliance Test Date	3/2/2017	3/2/2017	3/2/2017		
Compliance Run Start Time	9:47	10:49	11:50		
Compliance Run Finish Time	10:47	11:49	13:00		
Carbon Dioxide, % vd	6.17	6.18	6.13	6.16	
Oxygen, % vd	10.04	9.92	9.85	9.94	
Moisture Content of the Stack Gas, %	11.37	10.75	10.95	11.02	
Dry Stack Volumetric Flow Rate, dry scfm	882.9	886.3	901.9	890.3	
Nitrogen Oxides Concentration, ppmvd	1,558.7	1,668.1	1,703.6	1,643.5	
Nitrogen Oxides Concentration, ppmvd @ 15% O_2	847.0	896.6	909.9	884.5	
Nitrogen Oxides Emission Rate, lb/hr	9.86	10.59	11.00	10.48	*17.4*
Nitrogen Oxides Emission Rate, tons/yr	43.17	46.37	48.19	45.91	*76.2*
Carbon Monoxide Concentration, ppmvd	9.96	9.96	10.17	10.03	
Carbon Monoxide Concentration, ppmvd @ 15% O_2	5.41	5.35	5.43	5.40	
Carbon Monoxide Emission Rate, lb/hr	0.038	0.038	0.040	0.039	*8.5*
Carbon Monoxide Emission Rate, tons/yr	0.168	0.169	0.175	0.171	*37.2*

**Run was extended 10 minutes due to a process upset (See Problems, Deviations, and/or Exceptions section).*

Table 2. Summary of Gas Compressor C Testing

GOLDEN SPECIALTY

THE GOLD STANDARD FOR AIR TESTING

Air Quality Test Report

Annual Compliance Test Program for NO_x & CO

Western Refining Southwest
Gallup Refinery
Jamestown, New Mexico

Gas Compressor A

Title V Permit No.: P021-R2-M1; Emission Unit No.: G-C1A

Report Number: 170007-B
Date Tested: March 14, 2017
Date Prepared: April 13, 2017

PREPARED FOR
Ms. Loretta Morgan,
Environmental Specialist
Western Refining Southwest
Gallup Refinery
I-40 @ Exit 39
Jamestown, NM 87347

Phone 505.722.0242

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Air Quality Test Report

Annual Compliance Test Program for NO_x & CO

Western Refining Southwest
Gallup Refinery
Jamestown, New Mexico

Gas Compressor A

This report is supported by GOLDEN's Quality Assurance Manual. The information included in the report is authentic and accurate, and GOLDEN operated in conformance with ASTM D7036 to the best of our knowledge during this test program.

Certified by:

Scott B. Swiggard, Ph.D., QSTI 2006-025
Technical Director

Shamit Nakra, Ph.D., QI (Groups I-IV)
Project Manager / Onsite QI

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GOLDEN SPECIALTY

Air Quality Test Report

EXECUTIVE SUMMARY

Golden Specialty, Inc.'s (GOLDEN) Southwest Regional Office was contracted by Western Refining Southwest (WNR) to perform emissions testing at their Gallup Refinery located in Jamestown, New Mexico. Testing was conducted on March 14, 2017. GOLDEN was contracted to perform annual compliance testing for nitrogen oxides (NO_x) and carbon monoxide (CO) on the exhaust of Gas Compressor A, referred to by the refinery as GasCon Compressor A. Additional measurements were made for the determination of volumetric flow rates, oxygen (O_2), carbon dioxide (CO_2), and moisture. The test was conducted in accordance with all appropriate United States Environmental Protection Agency (USEPA) Methodologies; as well as all applicable New Mexico Environment Department (NMED) Air Quality Bureau requirements outlined in the facility's Title V Permit No. P021-R2-M1 and Title 40 Code of Federal Regulations (CFR) Part 63, Subpart ZZZZ, Sections 63.6610, 63.6612, 63.6620, 63.6640, and Table 4.

Testing consisted of three (3) one-hour runs on the compressor performed in accordance with USEPA Methods 1, 2, 3A, 4, 7E, and 10. Testing and analysis procedures used for this project are presented in the United States Environmental Protection Agency (USEPA) document Title 40, Code of Federal Regulations, Part 60 (40 CFR 60), Appendix A, and on the USEPA Technology Transfer Network Emission Measurement Center (EPA-TTN-EMC) website, Test Methods Section (http://www.epa.gov/ttn/emc/). Included in this test report are sections detailing the Test Program, including Executive Summary, Introduction, Test Results, Sampling Procedures, Source Information, and Sample Calculation Sections; with Appendices which include all resumes of key personnel, calibrations, field data, reference method data, and process data.

Provided in Table 1 is the summary of results for GasCon Compressor A.

Run Number	1	2	3	Measured Average	Compliance Limit
Compliance Test Date	3/14/2017	3/14/2017	3/14/2017		
Compliance Run Start Time	9:54	10:55	11:56		
Compliance Run Finish Time	10:54	11:55	12:56		
Carbon Dioxide, % vd	5.98	6.02	6.12	6.04	
Oxygen, % vd	10.41	10.25	10.07	10.24	
Moisture Content of the Stack Gas, %	10.50	9.47	11.44	10.47	
Dry Stack Volumetric Flow Rate, dry scfm	972.7	962.7	970.4	968.6	
Nitrogen Oxides Concentration, ppmvd	939.6	1,087.3	1,402.9	1,143.2	
Nitrogen Oxides Concentration, ppmvd @ 15% O_2	528.2	602.4	764.0	631.5	
Nitrogen Oxides Emission Rate, lb/hr	6.54	7.50	9.75	7.93	*17.4*
Nitrogen Oxides Emission Rate, tons/yr	28.67	32.83	42.70	34.73	*76.2*
Carbon Monoxide Concentration, ppmvd	4.23	3.94	3.77	3.98	
Carbon Monoxide Concentration, ppmvd @ 15% O_2	2.38	2.18	2.05	2.20	
Carbon Monoxide Emission Rate, lb/hr	0.018	0.017	0.016	0.017	*8.5*
Carbon Monoxide Emission Rate, tons/yr	0.078	0.072	0.070	0.074	*37.2*

Table 1. Summary of Gas Compressor A Testing

INTRODUCTION

Purpose of Test

The objective of the program was to conduct annual compliance testing on Gas Compressor A. The unit was tested to determine specific pollutants outlined in this report. Dr. Shamit Nakra managed the project and performed the testing, with the assistance of Mr. Jonathon Fuller. Ms. Loretta Morgan with WNR was the refinery representative for this test program. No agency personnel were onsite during testing.

For this test program, gas concentrations of O_2, CO_2, NO_x, and CO were measured with reference method (RM) analyzers. The concentrations for NO_x and CO were measured on a parts per million by volume, dry basis (ppmvd) and then corrected to a 15% O_2 basis. The concentrations for O_2 and CO_2 were measured on a percent, dry (% vd) basis. Based on the measured flow rates of the stack gas and operating hours, the mass emission rates of NO_x and CO in pounds per hour (lb/hr) and tons per year (tons/yr) were calculated.

Exhaust gas flow rate was determined using USEPA Methods 1-4. Gas concentrations were measured using USEPA Methods 3A (O_2 and CO_2), 7E (NO_x), and 10 (CO). The moisture content of the stack gas was measured using Method 4. Testing procedures are discussed in more detail in the test methods section. All calculated reference method data are provided in Appendix E, and examples of all calculations are presented in the Sample Calculation section of this report.

GOLDEN utilized a single sampling system for the performance of this Test Program. The sampling system (System One) was utilized for concentration measurements of O_2, CO_2, NO_x and CO. Measurement uncertainty associated with this testing is addressed by following the approved test methods and test plans. Additional information regarding the measurement uncertainty can be provided upon request. The test procedures referenced in this report are in accordance with the Test Plan for this project. Deviations from the Test Plan or published Reference Methods are documented in the Problems, Deviations and/or Exceptions section of this report.

Problems, Deviations, and/or Exceptions

Although not a requirement of the Reference Methods, GOLDEN operates its instrumental test trailers utilizing redundant systems in accordance with SOP GSC-EF009. System Two is not currently installed therefore only System One was utilized for this test program.

GOLDEN SPECIALTY

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TEST RESULTS

Detailed results for the testing performed at WNR's Gallup Refinery are provided in Table 2 for GasCon Compressor A. All supporting calibration and field data collected for this project are provided in the Appendices of this report.

Plant	Western Refining - Gallup Refinery	Address	Jamestown, NM	Job #	170007-B
Location	Gas Compressor A	Personnel	SN/JF	Date	3/14/2017

	Run Number	1	2	3	Measured Average	Compliance Limit
Date	Test Date	3/14/2017	3/14/2017	3/14/2017		
Start	Run Start Time	9:54	10:55	11:56		
End	Run Finish Time	10:54	11:55	12:56		
Θ	Net Run Time, min.	60	60	60	60.0	
C_p	Pitot Tube Coefficient	0.84	0.84	0.84	0.84	
Y	Dry Gas Meter Calibration Factor	0.973	0.973	0.973	0.973	
P_{Br}	Barometric Pressure, in. Hg	23.64	23.64	23.64	23.64	
ΔH	Average orifice meter Differential, inches H_2O	1.80	1.80	1.80	1.80	
V_m	Dry Gas Meter Volume Sampled, ft^3	41.482	41.939	42.505	41.975	
t_m	Average Dry Gas Meter Temperature, F	45.6	59.4	67.2	57.4	
V_{mstd}	Dry Gas Meter Volume Sampled, dscf	33.490	32.959	32.910	33.119	
V_{lc}	Total Moisture Liquid collected, mL	83.3	73.1	90.2	82.2	
V_{wstd}	Volume of Water Vapor, scf	3.93	3.45	4.25	3.88	
% H_2O	Moisture Content of Stack Gas, %	10.50	9.47	11.44	10.47	
%CO_2	Carbon Dioxide, % vd	5.98	6.02	6.12	6.04	
%O_2	Oxygen, % vd	10.41	10.25	10.07	10.24	
M_d	Dry Molecular Weight, lb/lb-Mole	29.37	29.37	29.38	29.38	
M_s	Wet Molecular weight, lb/lb-Mole	28.18	28.30	28.06	28.18	
P_g	Flue Gas Static Pressure, in. H_2O	-0.75	-0.75	-0.75	-0.75	
P_s	Absolute Flue Gas Pressure, in. Hg	23.58	23.58	23.58	23.58	
t_s	Average Stack Gas Temperature, °F	536.9	554.3	560.1	550.4	
$\sqrt{\Delta P}_{avg}$	Average Square-Root Velocity Head, in H_2O	0.904	0.894	0.921	0.907	
v_s	Average Stack Gas Velocity, ft/sec	79.54	79.18	82.07	80.27	
A_s	Stack Crossectional Area, ft^2	0.55	0.55	0.55	0.55	
Q_{aw}	Actual Volumetric Flue Gas Flow Rate, acfm	2,603	2,591	2,686	2,627	
Q_{std}	Dry Volumetric Flow Rate, dry scfm	972.7	962.7	970.4	968.6	
Source Operating Parameters						
PR	FCCU Crude Charge Rate, BPD	25,639	25,645	25,674	25,653	
$NO_{x\ ppmvd}$	Nitrogen Oxides Concentration, ppmvd	939.6	1,087.3	1,402.9	1,143.2	
$NO_{x\ ppmvd\ @\ 15\%\ O2}$	Nitrogen Oxides Concentration, ppmvd @ 15% O_2	528.2	602.4	764.0	631.5	
$NO_{x\ lb/dscf}$	Nitrogen Oxides Concentration, lb/dscf x 10^{-6}	112.1	129.8	167.4	136.5	
$NO_{x\ lb/hr}$	Nitrogen Oxides Emission Rate, lb/hr	6.54	7.50	9.75	7.93	17.4
$NO_{x\ tons/yr}$	Nitrogen Oxides Emission Rate, tons/yr	28.67	32.83	42.70	34.73	76.2
CO_{ppmvd}	Carbon Monoxide Concentration, ppmvd	4.23	3.94	3.77	3.98	
$CO_{ppmvd\ @\ 15\%\ O2}$	Carbon Monoxide Concentration, ppmvd @ 15% O_2	2.38	2.18	2.05	2.20	
$CO_{lb/dscf}$	Carbon Monoxide Concentration, lb/dscf x 10^{-6}	0.31	0.286	0.274	0.289	
$CO_{lb/hr}$	Carbon Monoxide Emission Rate, lb/hr	0.018	0.017	0.016	0.017	8.5
$CO_{tons/yr}$	Carbon Monoxide Emission Rate, tons/yr	0.078	0.072	0.070	0.074	37.2

Table 2. Gas Compressor A Test Results

SPECIALTY

Air Quality Test Report

TEST RESULTS

Detailed results for the testing performed on the Plat B Gas Compressor at WNR's Gallup Refinery are provided below in Table 2. All supporting calibration and field data collected for this project are provided in the Appendices of this report.

Plant	Western Refining - Gallup Refinery	Address	Jamestown, NM	Job #	150080-B
Location	Plat B Gas Compressor	Personnel	RS/AK	Date	3/4/2015

	Run Number	1	2	3	Average	Compliance
Date	Test Date	3/4/2015	3/4/2015	3/4/2015		
Start	Run Start Time	11:54	13:17	14:35		
End	Run Finish Time	12:54	14:17	15:35		
Θ	Net Run Time, min.	60.0	60.0	60.0	60.0	
C_p	Pitot Tube Coefficient	0.84	0.84	0.84	0.84	
Y	Dry Gas Meter Calibration Factor	0.985	0.985	0.985	0.985	
P_{Br}	Barometric Pressure, in. Hg	23.18	23.18	23.18	23.18	
ΔH	Average orifice meter Differential, inches H_2O	1.30	1.30	1.30	1.30	
V_m	Dry Gas Meter Volume Sampled, ft^3	43.647	44.686	43.633	43.989	
t_m	Average Dry Gas Meter Temperature, °F	52.8	55.4	59.7	55.9	
V_{mstd}	Dry Gas Meter Volume Sampled, dscf	34.440	35.077	33.970	34.496	
V_{lc}	Total Moisture Liquid collected, mL	132.0	101.4	95.1	109.5	
V_{wstd}	Volume of Water Vapor, scf	6.22	4.78	4.48	5.16	
% H_2O	Moisture Content of Stack Gas, %	15.31	12.00	11.66	12.99	
%CO_2	Carbon Dioxide, % vd	6.586	6.637	6.771	6.665	
%O_2	Oxygen, % vd	9.125	9.070	9.037	9.077	
M_d	Dry Molecular Weight, lb/lb-Mole	29.42	29.42	29.44	29.43	
M_s	Wet Molecular weight, lb/lb-Mole	27.67	28.05	28.11	27.95	
P_g	Flue Gas Static Pressure, in. H_2O	-0.36	-0.36	-0.36	-0.36	
P_s	Absolute Flue Gas Pressure, in. Hg	23.15	23.15	23.15	23.15	
t_s	Average Stack Gas Temperature, °F	589.1	579.7	585.0	584.6	
$\sqrt{\Delta P}_{avg}$	Average Square-Root Velocity Head, in H_2O	0.845	0.849	0.844	0.846	
v_s	Average Stack Gas Velocity, ft/sec	77.65	77.17	76.81	77.21	
A_s	Stack Crossectional Area, ft^2	0.57	0.57	0.57	0.57	
Q_{aw}	Actual Volumetric Flue Gas Flow Rate, acfm	2,670	2,653	2,641	2,655	
Q_{std}	Dry Volumetric Flow Rate, dry scfm	880.7	917.7	912.1	903.5	
Source Operating Parameter						
PR	Platformer Rate, BPD	6,421	6,421	6,421	6,421	
$NO_{x\ ppmvd}$	Nitrogen Oxides Concentration, ppmvd	857.4	896.7	919.3	891.1	
$NO_{x\ ppmvd\ @\ 15\%\ O2}$	Nitrogen Oxides Concentration, ppmvd @ 15% O_2	429.6	447.2	457.2	444.7	
$NO_{x\ lb/dscf}$	Nitrogen Oxides Concentration, lb/dscf x 10^{-6}	102.3	107.0	109.7	106.4	
$NO_{x\ lb/hr}$	Nitrogen Oxides Emission Rate, lb/hr	5.41	5.89	6.01	5.77	*23.1*
$NO_{x\ tons/yr}$	Nitrogen Oxides Emission Rate, tons/yr	23.68	25.81	26.30	25.27	*93.3*
CO_{ppmvd}	Carbon Monoxide Concentration, ppmvd	0.47	0.48	0.39	0.44	
$CO_{ppmvd\ @\ 15\%\ O2}$	Carbon Monoxide Concentration, ppmvd @ 15% O_2	0.23	0.24	0.19	0.22	
$CO_{lb/dscf}$	Carbon Monoxide Concentration, lb/dscf x 10^{-6}	0.034	0.035	0.028	0.032	
$CO_{lb/hr}$	Carbon Monoxide Emission Rate, lb/hr	0.0018	0.0019	0.0015	0.0017	*8.5*
$CO_{tons/yr}$	Carbon Monoxide Emission Rate, tons/yr	0.008	0.008	0.007	0.008	*37.2*

Table 2. Plat B Gas Compressor Test Results

GOLDEN SPECIALTY

THE GOLD STANDARD FOR AIR TESTING

Air Quality Test Report

Annual Compliance Test Program for NO_x & CO

Western Refining Southwest
Gallup Refinery
Jamestown, New Mexico

Plat B Gas Compressor

Title V Permit No.: P021-R2; Emission Unit No.: P-C1B

Report Number: 160108-B
Date Tested: March 30, 2016
Date Prepared: April 19, 2016

PREPARED FOR
Mr. Ed Riege,
Manager of Remediation and
Special Environmental Projects
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Air Quality Test Report

Annual Compliance Test Program for NO_x & CO

Western Refining Southwest
Gallup Refinery
Jamestown, New Mexico

Plat B Gas Compressor

This report is supported by GOLDEN's Quality Assurance Manual. The information included in the report is authentic and accurate, and GOLDEN operated in conformance with ASTM D7036 to the best of our knowledge during this test program.

Certified by:

Troy M. Burrows, QSTO 2008-113
Chief Operating Officer

Austin M. Keough, QI (Groups I-IV)
Environmental Technician II / Onsite QI

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GOLDEN SPECIALTY

Air Quality Test Report

EXECUTIVE SUMMARY

Golden Specialty, Inc.'s (GOLDEN) Southwest Regional Office was contracted by Western Refining Southwest (WNR) to perform emissions testing at their Gallup Refinery located in Jamestown, New Mexico. Testing was conducted on March 30, 2016. GOLDEN was contracted to perform annual compliance testing for nitrogen oxides (NO_x) and carbon monoxide (CO) on the exhaust of the Plat B Gas Compressor. Additional measurements were made for the determination of volumetric flow rates, oxygen (O_2), carbon dioxide (CO_2), and moisture. The test was conducted in accordance with all appropriate United States Environmental Protection Agency (USEPA) Methodologies; as well as all applicable New Mexico Environment Department (NMED) Air Quality Bureau requirements outlined in the facility's Title V Permit No. P021-R2 and Title 40 Code of Federal Regulations (CFR) Part 63, Subpart ZZZZ, Sections 63.6610, 63.6612, 63.6620, 63.6640, and Table 4.

Testing consisted of three (3) one-hour runs performed in accordance with USEPA Methods 1, 2, 3A, 4, 7E and 10. Testing and analysis procedures used for this project are presented in the United States Environmental Protection Agency (USEPA) document Title 40, Code of Federal Regulations, Part 60 (40 CFR 60), Appendix A, and on the USEPA Technology Transfer Network Emission Measurement Center (EPA-TTN-EMC) website, Test Methods Section (http://www.epa.gov/ttn/emc/). Included in this test report are sections detailing the Test Program, including Executive Summary, Introduction, Test Results, Sampling Procedures, Source Information, and Sample Calculation Sections; with Appendices which include all resumes of key personnel, calibrations, field data, reference method data, and process data.

Provided in Table 1 is the summary of results for the Plat B Gas Compressor.

Run Number	1	2	3	Average	Compliance
Compliance Test Date	3/30/2016	3/30/2016	3/30/2016		
Compliance Run Start Time	14:04	15:25	16:47		
Compliance Run Finish Time	15:04	16:25	17:47		
Carbon Dioxide, % vd	5.96	5.98	6.03	5.99	
Oxygen, % vd	10.30	10.34	10.32	10.32	
Moisture Content of the Stack Gas, %	10.23	10.22	10.12	10.19	
Dry Stack Volumetric Flow Rate, dry scfm	1,014	1,038	1,044	1,032	
Nitrogen Oxides Concentration, ppmvd	368.3	365.0	371.5	368.3	
Nitrogen Oxides Concentration, ppmvd @ 15% O_2	204.9	204.0	207.3	205.4	
Nitrogen Oxides Emission Rate, lb/hr	2.67	2.71	2.78	2.72	*23.1*
Nitrogen Oxides Emission Rate, tons/yr	11.72	11.89	12.16	11.92	*93.3*
Carbon Monoxide Concentration, ppmvd	< 0.50	< 0.50	< 0.50	< 0.50	
Carbon Monoxide Concentration, ppmvd @ 15% O_2	< 0.28	< 0.28	< 0.28	< 0.28	
Carbon Monoxide Emission Rate, lb/hr	< 0.0022	< 0.0023	< 0.0023	< 0.0022	*8.5*
Carbon Monoxide Emission Rate, tons/yr	< 0.0097	< 0.0099	< 0.0100	< 0.0099	*37.2*

Table 1. Summary of Plat B Gas Compressor Testing

GOLDEN SPECIALTY

Air Quality Test Report

INTRODUCTION

Purpose of Test

The objective of the program was to conduct annual compliance testing on the Plat B Gas Compressor. The unit was tested to determine specific pollutants outlined in this report. Mr. Austin Keough managed the project and performed the testing, with the assistance of Mr. Gukbo Kim. Mr. Ed Riege with WNR was the refinery representative for this test program. No agency personnel were onsite during testing.

For this test program, gas concentrations of O_2, CO_2, NO_x, and CO were measured with reference method (RM) analyzers. The concentrations for NO_x and CO were measured on a parts per million by volume, dry basis (ppmvd) and then corrected to a 15% O_2 basis. The concentrations for O_2 and CO_2 were measured on a percent, dry (% vd) basis. Based on the measured flow rates of the stack gas and operating hours, the mass emission rates of NO_x and CO in pounds per hour (lb/hr) and tons per year (tons/yr) were calculated.

Exhaust gas flow rate was determined using USEPA Methods 1-4. Gas concentrations were measured in using USEPA Methods 3A (O_2 and CO_2), 7E (NO_x), and 10 (CO). The moisture content of the stack gas was measured using Method 4. Testing procedures are discussed in more detail in the test methods section. All calculated reference method data are provided in Appendix E, and examples of all calculations are presented in the Sample Calculation section of this report.

GOLDEN utilized a single sampling system for the performance of this Test Program. The sampling system (System One) was utilized for concentration measurements of O_2, CO_2, and CO. Measurement uncertainty associated with this testing is addressed by following the approved test methods and test plans. Additional information regarding the measurement uncertainty can be provided upon request. The test procedures referenced in this report are in accordance with the Test Plan for this project. Deviations from the Test Plan or published Reference Methods are documented in the Problems, Deviations and/or Exceptions section of this report.

Problems, Deviations, and/or Exceptions

Although not a requirement of the Reference Methods, GOLDEN operates its instrumental test trailers utilizing redundant systems in accordance with SOP GSC-EF009. System Two is not currently installed therefore only System One was utilized for this test program.

Run 1 of the RM data was used for stratification testing only. Compliance results were based on RATAmation Runs 2-4.

GOLDEN SPECIALTY

Air Quality Test Report

TEST RESULTS

Detailed results for the testing performed on the Plat B Gas Compressor at WNR's Gallup Refinery are provided below in Table 2. All supporting calibration and field data collected for this project are provided in the Appendices of this report.

Plant	Western Refining - Gallup Refinery	Address	Jamestown, NM	Job #	160108-B
Location	Plat B Gas Compressor	Personnel	AK/GK	Date	3/30/2016

	Run Number	1	2	3	Average	Compliance
Date	Test Date	3/30/2016	3/30/2016	3/30/2016		
Start	Run Start Time	14:04	15:25	16:47		
End	Run Finish Time	15:04	16:25	17:47		
Θ	Net Run Time, min.	60.0	60.0	60.0	60.0	
C_p	Pitot Tube Coefficient	0.84	0.84	0.84	0.84	
Y	Dry Gas Meter Calibration Factor	1.010	1.010	1.010	1.010	
P_{Br}	Barometric Pressure, in. Hg	23.18	23.18	23.18	23.18	
ΔH	Average orifice meter Differential, inches H_2O	1.50	1.50	1.50	1.50	
V_m	Dry Gas Meter Volume Sampled, ft^3	44.561	44.900	45.403	44.955	
t_m	Average Dry Gas Meter Temperature, °F	54.1	54.3	52.8	53.7	
V_{mstd}	Dry Gas Meter Volume Sampled, dscf	35.982	36.244	36.758	36.328	
V_{lc}	Total Moisture Liquid collected, mL	87.0	87.5	87.8	87.4	
V_{wstd}	Volume of Water Vapor, scf	4.10	4.13	4.14	4.12	
% H_2O	Moisture Content of Stack Gas, %	10.23	10.22	10.12	10.19	
%CO_2	Carbon Dioxide, % vd	5.96	5.98	6.03	5.99	
%O_2	Oxygen, % vd	10.30	10.34	10.32	10.32	
M_d	Dry Molecular Weight, lb/lb-Mole	29.37	29.37	29.38	29.37	
M_s	Wet Molecular weight, lb/lb-Mole	28.20	28.21	28.23	28.21	
P_g	Flue Gas Static Pressure, in. H_2O	0.10	0.10	0.10	0.10	
P_s	Absolute Flue Gas Pressure, in. Hg	23.19	23.19	23.19	23.19	
t_s	Average Stack Gas Temperature, °F	474.7	507.8	509.6	497.4	
$\sqrt{\Delta P}_{avg}$	Average Square-Root Velocity Head, in H_2O	0.918	0.957	0.962	0.946	
v_s	Average Stack Gas Velocity, ft/sec	78.85	83.58	84.09	82.17	
A_s	Stack Crossectional Area, ft^2	0.55	0.55	0.55	0.55	
Q_{aw}	Actual Volumetric Flue Gas Flow Rate, acfm	2,580	2,735	2,752	2,689	
Q_{std}	Dry Volumetric Flow Rate, dry scfm	1,014	1,038	1,044	1,032	
Source Operating Parameter						
PR	Platformer Rate, BPD	7,101	7,101	7,101	7,101	
$NO_{x\ ppmvd}$	Nitrogen Oxides Concentration, ppmvd	368.3	365.0	371.5	368.3	
$NO_{x\ ppmvd\ @\ 15\%\ O2}$	Nitrogen Oxides Concentration, ppmvd @ 15% O_2	204.9	204.0	207.3	205.4	
$NO_{x\ lb/dscf}$	Nitrogen Oxides Concentration, lb/dscf x 10^{-6}	44.0	43.6	44.3	44.0	
$NO_{x\ lb/hr}$	Nitrogen Oxides Emission Rate, lb/hr	2.67	2.71	2.78	2.72	*23.1*
$NO_{x\ tons/yr}$	Nitrogen Oxides Emission Rate, tons/yr	11.72	11.89	12.16	11.92	*93.3*
CO_{ppmvd}	Carbon Monoxide Concentration, ppmvd	< 0.50	< 0.50	< 0.50	< 0.50	
$CO_{ppmvd\ @\ 15\%\ O2}$	Carbon Monoxide Concentration, ppmvd @ 15% O_2	< 0.28	< 0.28	< 0.28	< 0.28	
$CO_{lb/dscf}$	Carbon Monoxide Concentration, lb/dscf x 10^{-6}	< 0.036	< 0.036	< 0.036	< 0.036	
$CO_{lb/hr}$	Carbon Monoxide Emission Rate, lb/hr	< 0.0022	< 0.0023	< 0.0023	< 0.0022	*8.5*
$CO_{tons/yr}$	Carbon Monoxide Emission Rate, tons/yr	< 0.010	< 0.010	< 0.010	< 0.010	*37.2*

Table 2. Plat B Gas Compressor Test Results

GOLDEN SPECIALTY

THE GOLD STANDARD FOR AIR TESTING

Air Quality Test Report

Annual Compliance Test Program for NO_x & CO

Western Refining Southwest
Gallup Refinery
Jamestown, New Mexico

Plat B Gas Compressor

Title V Permit No.: P021-R2-M1; Emission Unit No.: P-C1B

Report Number: 170007
Date Tested: March 1, 2017
Date Prepared: March 30, 2017

PREPARED FOR
Ms. Loretta Morgan,
Environmental Specialist
Western Refining Southwest
Gallup Refinery
I-40 @ Exit 39
Jamestown, NM 87347

Phone 505.722.0242

Prepared by:
GOLDEN SPECIALTY, INC.
844.3GOLDEN
(844.346.5336)
goldenspecialty.com

Air Quality Test Report

Annual Compliance Test Program for NO_x & CO

Western Refining Southwest
Gallup Refinery
Jamestown, New Mexico

Plat B Gas Compressor

This report is supported by GOLDEN's Quality Assurance Manual. The information included in the report is authentic and accurate, and GOLDEN operated in conformance with ASTM D7036 to the best of our knowledge during this test program.

Certified by:

Scott B. Swiggard, Ph.D., QSTI 2006-025
Technical Director

Shamit Nakra, Ph.D., QI (Groups I-IV)
Project Manager / Onsite QI

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Golden Specialty, Inc.'s (GOLDEN) Southwest Regional Office was contracted by Western Refining Southwest (WNR) to perform emissions testing at their Gallup Refinery located in Jamestown, New Mexico. Testing was conducted on March 1, 2017. GOLDEN was contracted to perform annual compliance testing for nitrogen oxides (NO_x) and carbon monoxide (CO) on the exhaust of the Plat B Gas Compressor. Additional measurements were made for the determination of volumetric flow rates, oxygen (O_2), carbon dioxide (CO_2), and moisture. The test was conducted in accordance with all appropriate United States Environmental Protection Agency (USEPA) Methodologies; as well as all applicable New Mexico Environment Department (NMED) Air Quality Bureau requirements outlined in the facility's Title V Permit No. P021-R2-M1 and Title 40 Code of Federal Regulations (CFR) Part 63, Subpart ZZZZ, Sections 63.6610, 63.6612, 63.6620, 63.6640, and Table 4.

Testing consisted of three (3) one-hour runs performed in accordance with USEPA Methods 1, 2, 3A, 4, 7E and 10. Testing and analysis procedures used for this project are presented in the United States Environmental Protection Agency (USEPA) document Title 40, Code of Federal Regulations, Part 60 (40 CFR 60), Appendix A, and on the USEPA Technology Transfer Network Emission Measurement Center (EPA-TTN-EMC) website, Test Methods Section (http://www.epa.gov/ttn/emc/). Included in this test report are sections detailing the Test Program, including Executive Summary, Introduction, Test Results, Sampling Procedures, Source Information, and Sample Calculation Sections; with Appendices which include all resumes of key personnel, calibrations, field data, reference method data, and process data.

Provided in Table 1 is the summary of results for the Plat B Gas Compressor.

Run Number	1	2	3	Average	Compliance
Compliance Test Date	3/1/2017	3/1/2017	3/1/2017		
Compliance Run Start Time	16:34	17:35	18:36		
Compliance Run Finish Time	17:34	18:35	19:36		
Carbon Dioxide, % vd	6.60	6.58	6.57	6.58	
Oxygen, % vd	9.33	9.44	9.50	9.42	
Moisture Content of the Stack Gas, %	11.26	11.02	10.95	11.08	
Dry Stack Volumetric Flow Rate, dry scfm	926.2	935.7	936.7	932.9	
Nitrogen Oxides Concentration, ppmvd	674.0	616.3	593.3	627.9	
Nitrogen Oxides Concentration, ppmvd @ 15% O_2	343.6	317.3	306.9	322.6	
Nitrogen Oxides Emission Rate, lb/hr	4.47	4.13	3.98	4.19	*23.1*
Nitrogen Oxides Emission Rate, tons/yr	19.58	18.09	17.43	18.37	*93.3*
Carbon Monoxide Concentration, ppmvd	< 0.50	< 0.50	< 0.50	< 0.50	
Carbon Monoxide Concentration, ppmvd @ 15% O_2	< 0.25	< 0.26	< 0.26	< 0.26	
Carbon Monoxide Emission Rate, lb/hr	< 0.0020	< 0.0020	< 0.0020	< 0.0020	*8.5*
Carbon Monoxide Emission Rate, tons/yr	< 0.0088	< 0.0089	< 0.0089	< 0.0089	*37.2*

Table 1. Summary of Plat B Gas Compressor Testing

BOLs By Product

Product Detail Report: 07/26/16 (Product)

Terminal 0003
Western Gallup Refinery
I-40 Exit 39
Jamestown, NM 87347

Statistics: Total BOL Count: 111
Total BOL Gross Volume: 756,455
Total BOL Net Volume: 746,166

Tank Product Code	Type	Tracking	Product Code / Description		Gross Volume	Net Volume
0	B		1102	102 REGULAR 87	1,998	1,967
0	B		1151	151 REG 86 W/10% ETH	398,179	392,654
0	B		1152	152 Reg 87 w/10% Eth	136,023	134,137
0	B		1251	251 MID 88 W/10 ETOH	7,010	6,953
0	B		1252	252 Mid 89 w/10% Eth	2,550	2,518
0	B		1302	302 Prem 91 w/10% Etoh	113,429	112,083
0	B		1902	83 BASE REGULAR	97,266	95,854
				Grand Total	756,455	746,166

BOLs By Product

Product Detail Report: 07/27/16 (Product)

Terminal 0003
Western Gallup Refinery
I-40 Exit 39
Jamestown, NM 87347

Statistics: Total BOL Count: 108
Total BOL Gross Volume: 756,423
Total BOL Net Volume: 745,831

Tank Product Code	Type	Tracking	Product Code / Description		Gross Volume	Net Volume
0	B		1102	102 REGULAR 87	3,882	3,832
0	B		1104	Premium Sub-Octane 89	45,087	44,459
0	B		1151	151 REG 86 W/10% ETH	438,511	432,114
0	B		1152	152 Reg 87 w/10% Eth	135,522	133,654
0	B		1251	251 MID 88 W/10 ETOH	11,543	11,413
0	B		1302	302 Prem 91 w/10% Etoh	79,837	78,802
0	B		1902	83 BASE REGULAR	42,041	41,557
				Grand Total	756,423	745,831

SECTION II: DESIGN BASIS AND PERFORMANCE SUMMARY

DESIGN BASIS

The John Zink Series 2000™ Adsorption/Absorption or High Efficiency Adsorption-Absorption Hydrocarbon Vapor Recovery Unit is based on proprietary technology, sound engineering practices, and data furnished by the customer and summarized as follows:

APPLICATION:
Truck Rack: X

DESIGN HYDROCARBON EMISSION CONTROL REQUIREMENT:
10 Milligrams of Hydrocarbon Vented per Liter of Product Transferred

VRU ELEVATION ABOVE SEA LEVEL:
7000 Feet

ELECTRICAL CLASSIFICATION: CLASS 1, GROUP D, DIVISION 2 PER NEC

AMBIENT TEMPERATURE:
Minimum: 0 °F
Maximum: 100 °F

PRODUCTS LOADED:
Product #1: GASOLINE
Product #2: DIESEL

MAXIMUM PRODUCT LOADING PROFILE CONNECTED TO VRU (English Units):

	Product #1 & Product #2	Total any Combination
Instantaneous Rate, gal./min:		7,800
15 Minute Throughput, gallons:		52,800
1 Hour Throughput, gallons:		105,600
4 Hour Throughput, gallons:		352,000
24 Hour Throughput, gallons:		1,500,000

MAXIMUM VAPOR PROCESSING PROFILE (Including any applicable growth factors):

Instantaneous Rate:	**1,042** CFM
15 Minutes:	**7,058** CF
1 Hour:	**14,118** CF
4 Hour:	**47,060** CF
24 Hour:	**200,535** CF

VAPOR PROPERTIES:

Inlet Temperature Range: **AMBIENT** °F
Inlet Pressure Range: **0 TO 12"** WCG
Maximum Hydrocarbon Concentration.: **60** Vol% As C3
Vapor Composition at Max. H.C. Conc.:

Component	Vol%
GASOLINE & DIESEL	**60**
AIR	**40**
Total	**100.0**

LIQUID ABSORBENT PROPERTIES:

Name: **GASOLINE**
Maximum Temperature
Summer: **80 °F**
Winter: **40 °F**
Maximum Reid Vapor Pressure:
15 PSIA AT 60°F

Specific Gravity @ 60 °F (15.5 °C): **0.7**

ABSORBENT SUPPLY TANK:

Bottom of Tank Elevation Relative To VRU Skid Floor:
Above: **1 FEET**
Below: **0 FEET**
Height of Absorbent in Tank:
Maximum: **40 FEET**
Minimum: **5 FEET**
Distance from VRU Inlet:
500 FEET

UTILITIES AVAILABLE:

Electricity:

Main:	**Volts 460**	**PHASE 3**	**CYCLES 60**
Control:	**Volts 120**	**PHASE 1**	**CYCLES 60**

Instrument Air:
Pressure **60 PSIG REQUIRED**

ADSORBER REGENERATION CYCLE TIME:
15 Minutes

OTHER DATA WHEN APPLICABLE:

PERFORMANCE SUMMARY

HYDROCARBON EMISSION CONTROL REQUIREMENT:
10 Milligrams of Hydrocarbon Vented per Liter of Product Transferred
(See Performance Guarantee in This Manual)

ESTIMATED PRODUCT RECOVERY:
2 Gallons/1000 Gallons Loaded or Liters/1000 Liters Loaded

ABSORBENT CIRCULATION REQUIREMENT:
190 Gallons/Minute

ESTIMATED VRU PRESSURE DROP:
(From Inlet Vapor Connection To Adsorber Vent)
12" WCG INCLUDING 10" INLET FLAME ARRESTER

ESTIMATED VRU POWER REQUIREMENTS:

Connected Horsepower:	**97**
Average Brake Horsepower:	**71.6**
Average Kilowatts:	**57.72**

COMBUSTION RENTAL PROPOSAL

for a

PORTABLE EMISSION CONTROL SYSTEM (PECS®)

Located in Gallup, NM

prepared for:

Western Refining
1-40, Exit 39
Jamestown, NM 87347

to the attention of:

Amy Chalom
Phone: 701-334-6848
E-mail address: amy.chalom@wnr.com

prepared by:

Diane Yob
Applications Engineer - Combustion Rental Group
John Zink Company, LLC
PO Box 21220
11920 East Apache (74116-1300)
Tulsa, OK 74121-1220
Phone: 918-234-1945
Fax: 918-234-1968
E-mail address: diane.yob@johnzink.com

Proposal #: RE2016-07-04

Dated: July 14, 2016

RENTAL EQUIPMENT PROPOSAL

Thank you for contacting John Zink regarding a temporary combustion system for gasoline truck loading applications. For these applications we recommend our horizontal Portable Emission Control System or PECS®. These units come totally self contained on an 8 Ft wide by 45 Ft long trailer. All required instrumentation and burner management/control equipment are integrally mounted on the trailer along with the combustion vessel, burners, and waste gas delivery piping. Typically these systems are connected and on-line within a half day of arrival at the site.

The PECS® operates like an enclosed combustion system where all the burning takes place inside the vessel to hide the flames. All instrumentation, piping and combustion equipment required for burning, monitoring and isolating the system are included on the trailer.

The PECS® unit will automatically make adjustments for the operating conditions it may eventually encounter *(e.g. high BTU, low BTU and all conditions in between)*. If the hydrocarbon concentration drops off and the system cannot maintain the operating temperature *(typically 500º F – 1,400º F)* with the waste vapors alone, the unit can be set up to inject auxiliary fuel into the waste stream to maintain the operating temperature. This feature can also be disabled if desired.

When the vapors are rich, fuel gas will automatically be “pinched back” and air will be added to cool the combustion chamber down. During this case the only fuel gas required is for the pilots, which require 100 SCFH natural gas, or propane at approximately 1 GAL/HR for operation. These pilots are continuous whenever the system is on line.

The PECS® system is equipped to either pull the vapors to the combustion chamber *(for tank degassing applications)* with an on-board vapor suction blower or if your system can deliver the vapors at sufficient pressure at the edge of the trailer, the blowers do not need to be used. The blowers will pull approximately 640 SCFM *(4,800 GPM)* with suction pressure of approximately 10" WC. The system would arrive at the site with both capabilities.

Operationally the PECS® units are fairly simple. Once the utilities and vapor piping *(typically hose is used)* from the process are installed and the unit is turned on, everything is automatic thus reducing the potential for incorrect operation.

THE SEQUENCE OF EVENTS AFTER THE UNIT IS TURNED ON ARE:

1. Vessel purge - the combustion air blower blows fresh air through the vessel to ensure there are no flammable vapors inside prior to lighting the pilots.
2. Pilot Ignition - Immediately after purging a fuel gas solenoid valve opens and an ignition transformer is energized to light the two pilots located inside the vessel.
3. Burner Ignition - After a slight delay an auxiliary fuel gas solenoid valve will open to begin adding fuel gas to the main burner to begin heating the vessel to the operating temperature setpoint *(typically 500º F - 1,400º F)*. This feature can be disabled if not desired.
4. Waste Gas Introduction - After a slight delay after the burner is lit, the waste gas valve will open *(and if so connected, the vapor blower will start)* to begin introducing vapors to the burner.

BURNER MANAGEMENT SYSTEM:

The burner management system will automatically monitor key safety conditions and shut all fuel and waste gas valves to the vessel in the event a potentially hazardous condition is detected. The Primary Shutdowns are:

1. Flame Failure - The pilots are monitored with UV scanners and a failure to see a flame will shut the unit down.
2. High Stack Temperature - To protect the equipment, the unit is shutdown in the event the temperature reaches 2,000º F in the vessel
3. High Detonation Arrester Temperature - In the event of a flashback, a thermocouple would detect a high temperature on the face of the detonation arrester and shut the system down. The detonation arrester is a Group D Coast Guard approved device.

REQUIRED UTILITIES *(SUPPLIED BY CUSTOMER)*:

1. Electricity Requirements: 460 V / 3 phase / 60 HZ (approximately 100 amp maximum usage). *If needed, contact John Zink for generator rental fee.*

EMERGENCY GENERATOR VENDOR DATA

250 kW GENERATOR SET

CATERPILLAR®

TECHNICAL DATA

250 kW/313 kV•A Standby Power Generator Set – 1800 rpm/60 Hz

Package Performance		
Power rating @ 0.8 PF with fan	kW	250
Power rating @ 0.8 PF with fan	kV•A	313
Fuel Consumption		
100% Load with Fan	gph	18.9
75% Load with Fan	gph	13.4
Cooling System		
Ambient Air Temperature (Consult T.M.I.)		
Designed for operation up to	Deg F	122
Air Flow Restriction (After Radiator)	in water	.25
Standard Radiator Arrangement Data		
Air Flow (Max @ Rated Speed)	cfm	13 500
Engine Coolant Capacity with Radiator	gal	17.4
Engine Coolant Capacity without Radiator	gal	4.2
Exhaust System		
Combustion Air Inlet Flow Rate	cfm	775
Exhaust Gas Stack Temperature	Deg F	1020
Exhaust Gas Flow Rate	cfm	2050
Exhaust Flange Size — (Internal Diameter)	in	6.0
System Backpressure (Max. Allowable)	in water	27
Heat Rejection		
Heat Rejection to Coolant (Total)	BTU/min	5971
Heat Rejection to Exhaust (Total)	BTU/min	16 265
Heat Rejection to Atmosphere from Engine	BTU/min	3469
Heat Rejection to Atmosphere from Generator	BTU/min	1267

Deration: Generator set is designed to operate in ambient temperatures up to 122° F (50° C) and at higher altitudes. Please consult factory for available outputs.

CAT® 446 FRAME GENERATOR SPECIFICATIONS

Type .... Self excited, static regulated, brushless
Construction...... Single bearing, close coupled
Three phase............. 12 lead reconnectable
Insulation........... Class H with tropicalization and antiabrasion
Enclosure .... Drip proof IP22
Alignment .... Pilot shaft
Overspeed capability 150%
Wave form .... Less than 5% deviation
Paralleling capability .... With optional droop transformer
Voltage regulator......... 3-phase sensing with Volts-per-Hertz
Voltage regulation.. Less than ± 1/2% (steady state)
Less than ± 1% (no load to full load)
Voltage gain ...... Adjustable to compensate for engine speed droop and line loss
TIF .... Less than 50
THD .... Less than 5%

CAT® 3306 ATAAC ENGINE SPECIFICATIONS

I-6, 4-stroke-cycle watercooled diesel
Bore — in (mm) 4.75 (121)
Stroke — in (mm) 6.0 (152)
Displacement — cu in (L) 638 (10.5)
Compression ratio........................ 15:1
Aspiration................ Air-to-Air Aftercooled

CAT® CONTROL PANEL

24 Volt DC Control
NEMA 1, IP22 enclosure
Electrically dead front
Lockable hinged door
Generator instruments meet ANSI C-39-1
Terminal box mounted
Single location customer connector point
EC compliant — segregated AC/DC connection

Consult your Caterpillar dealer for available voltages.

CATERPILLAR® **250 kW GENERATOR SET**

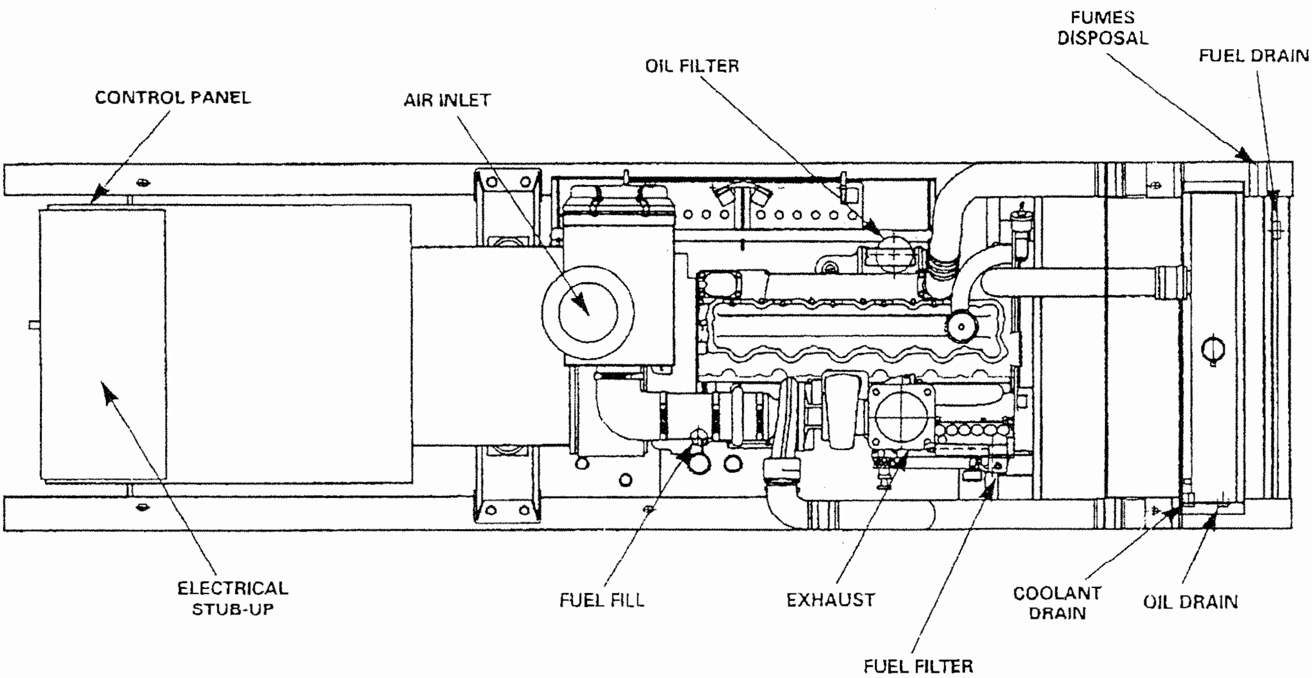
FACTORY INSTALLED STANDARD & OPTIONAL EQUIPMENT

SYSTEM	STANDARD	OPTIONAL
Air inlet	modular air cleaner, single element with dust evacuator service indicator	dual element air cleaner heavy-duty air cleaner air inlet shutoff
Cooling	radiator with guard coolant drain line with valve fan and belt guards Caterpillar Extended Life Coolant	radiator duct flange jacket water heater with isolation valves low coolant level alarm and shutdown heat exchanger and expansion tank
Exhaust	stainless steel exhaust flex with mating weld flange industrial grade muffler	residential muffler critical muffler muffler mounting kit, through-wall installation kit engine exhaust guarding
Fuel	primary fuel filter secondary fuel filter fuel priming pump fuel pressure gauge flexible fuel lines	water separator manual transfer pump automatic transfer systems, 3 configurations low fuel level alarm and shutdown
Generator	self excited class F temperature rise 266° F (130° C) standby circuit breaker, IEC compliant 3-pole with shunt trip	permanent magnet excitation 2:1 Volts/Hz AVR Digital Voltage Regulator (D.V.R.) D.V.R. with KVAR/PF control space heater reactive droop kit oversize and premium generators circuit breaker, IEC compliant, 4-pole with shunt trip
Governor	hydra-mechanical	electronic isochronous and load sharing
Control panels	EMCP II	electromechanical auto start/stop panel switchgear conversion EMCP II+ system expansion modules
Lube	lubricating oil oil drain line with valves fumes disposal	manual sump pump
Mounting	formed steel base with integral fuel tank, 8 hour capacity – minimum linear vibration isolators between base and engine-generator	wide base with integral fuel tank extended capacity fuel tank base skid base
Starting/ charging	45 amp charging alternator Energize To Run (ETR) fuel shutoff solenoid 24 volt starting motor batteries with rack and cables	integral 5 amp battery charger oversize batteries ether starting aid battery disconnect
Other		enclosures – sound attenuated, weather protective automatic transfer switch CE certification

CATERPILLAR®

250 kW GENERATOR SET

STANDBY POWER GENERATOR SET PACKAGE — TOP VIEW



PACKAGE DIMENSIONS		
Length	in	150
Width	in	43
Height	in	76
Shipping Weight	lb	6977

Note: General configuration not to be used for installation. See general dimension drawings for detail.

RATING DEFINITIONS AND CONDITIONS

Standby — Output available with varying load for the duration of the interruption of the normal source power. Fuel stop power in accordance with ISO3046/1, AS2789, DIN6271, and BS5514.

Ratings are based on SAE J1349 standard conditions. These ratings also apply at ISO3046/1, DIN6271, and BS5514 standard conditions.

Fuel rates are based on fuel oil of 35° API (60° F or 16° C) gravity having an LHV of 18 390 Btu/lb (42 780 kJ/kg) when used at 85°F (29° C) and weighing 7.001 lbs/U.S. gal. (838.9 g/liter).

Additional ratings may be available for specific customer requirements. Consult your Caterpillar representative for details.

Emissions Data for CAT 3306 - 250 kW Genset

DM3400-00 PGS STANDBY 60 HERTZ
GEN 250.0 W/F EKW 263.0 W/O F EKW W/F BHP 382 W/O F BHP 1800 @ RPM

EXH STK DIA 5.0 IN
INFO CODE 05 - EMISSIONS DATA * * REFERENCE NOTES * * * * * *

EMISSIONS DATA MEASUREMENT IS CONSISTENT WITH THOSE DESCRIBED IN EPA CFR 40 PART 86 SUBPART D AND ISO 8178-1 FOR MEASURING HC, CO, CO2 AND NOX. THESE PROCEDURES ARE VERY SIMILAR TO THE METHODS DESCRIBED IN EPA CFR 40 PART 60 APPENDIX A METHOD 25A FOR HYDROCARBONS, METHOD 10 FOR CO, METHOD 7E FOR NOX.

DATA SHOWN IS BASED ON STEADY STATE ENGINE OPERATING CONDITIONS OF 77 DEG F, 28.42 IN HG AND NUMBER 2 DIESEL FUEL WITH 35 DEG API AND LHV OF 18,390 BTU/LB.

TO PROPERLY APPLY THIS DATA YOU MUST REFER TO PERFORMANCE PARAMETER DM1176 FOR ADDITIONAL INFORMATION, (APPLICATION GKN402, PROGRAM 03).
-GKGPE1 TMI - ENGINE AND COMP PERF DATE: 03/31/2000
20 - PACKAGE SET PERFORMANCE TIME: 12:11 13
3306B DI TA AA DRY MANF TURBO QTY 1 CAT 3 GOV
DM3400-00 PGS STANDBY 60 HERTZ EXH STK DIA 5.0 IN
GEN 250.0 W/F EKW 263.0 W/O F EKW W/F BHP 382 W/O F BHP 1800 @ RPM
CERTIFICATION YEAR CERT AGENCY
INFO CODE 05 - EMISSIONS DATA * * * * * RATED SPEED * * * * STANDARD TIMING
"NOT TO EXCEED DATA"

GEN PWR EKW	% LOAD	ENG PWR BHP	g/bhp-hr	NOX (AS NO2)	CO	TOTAL HC LB/HR	PART MATTER	O2 (DRY) IN EXH (VOL) %	SMOKE OPAC %	BOSCH SMOKE NO.
250.0	100	382.2	5.1	4.29	.95	.12	.110	10.10	1.7	1.29
187.5	75	289.0	5.7	3.64	.41	.15	.060	10.90	1.1	1.27
125.0	50	198.3	6.5	2.83	.46	.17	.060	12.20	1.4	1.30
62.5	25	110.1	6.4	1.56	.49	.11	.060	14.10	1.9	1.35
25.0	10	55.1	6.4	.78	.74	.17	.060	15.80	2.1	1.35

-GKGPE2 TMI - ENGINE AND COMP PERF DATE: 03/31/2000
20 - PACKAGE SET PERFORMANCE TIME: 12:14:13
3306B DI TA AA DRY MANF TURBO QTY 1 CAT 3 GOV
DM3400-00 PGS STANDBY 60 HERTZ EXH STK DIA 5.0 IN
GEN 250.0 W/F EKW 263.0 W/O F EKW W/F BHP 382 W/O F BHP 1800 @ RPM
CERTIFICATION YEAR CERT AGENCY
INFO CODE 05 - EMISSIONS DATA * * * * * RATED CONDITIONS * * STANDARD TIMING
"NOMINAL DATA"

AT RATED:

WET EXHAUST MASS	3497 LB/HR
WET EXHAUST FLOW (994 DEG F STACK TEMP)	2175 CFM
WET EXHAUST FLOW RATE (32 DEG F AND 29.98 IN HG)...	735 STD CFM
DRY EXHAUST FLOW RATE (32 DEG F AND 29.98 IN HG)...	655 STD CFM
FUEL FLOW RATE	19.0 GAL/HR

$$\text{g/bhp-hr} = \frac{4.29\ \text{lb}}{382.2\ \text{bhp}\ \text{hr}} \times \frac{453.59\ \text{g}}{\text{lb}} = 5\ \frac{\text{g}}{\text{bhp-hr}}$$

$$2175\ \frac{\text{ft}^3}{\text{min}} \times \frac{1\ \text{min}}{60\ \text{s}} \times \frac{4}{\pi (5/12)^2}$$

Federal Environment and Safety Codified Regulations
TITLE 40—Protection of Environment
PART 98—MANDATORY GREENHOUSE GAS REPORTING
SUBPART C—General Stationary Fuel Combustion Sources

Table C-2 to Subpart C of Part 98 —Default CH_4 and N_2O Emission Factors for Various Types of Fuel

Fuel type	Default CH_4 emission factor (kg CH_4 /mmBtu)	Default N_2O emission factor (kg N_2O/mmBtu)
Coal and Coke (All fuel types in Table C-1)	1.1×10^{-02}	1.6×10^{-03}
Natural Gas	1.0×10^{-03}	1.0×10^{-04}
Petroleum (All fuel types in Table C-1)	3.0×10^{-03}	6.0×10^{-04}
Fuel Gas	3.0×10^{-03}	6.0×10^{-04}
Municipal Solid Waste	3.2×10^{-02}	4.2×10^{-03}
Tires	3.2×10^{-02}	4.2×10^{-03}
Blast Furnace Gas	2.2×10^{-05}	1.0×10^{-04}
Coke Oven Gas	4.8×10^{-04}	1.0×10^{-04}
Biomass Fuels—Solid (All fuel types in Table C-1, except wood and wood residuals)	3.2×10^{-02}	4.2×10^{-03}
Wood and wood residuals	7.2×10^{-03}	3.6×10^{-03}
Biomass Fuels—Gaseous (All fuel types in Table C-1)	3.2×10^{-03}	6.3×10^{-04}
Biomass Fuels—Liquid (All fuel types in Table C-1)	1.1×10^{-03}	1.1×10^{-04}

Note: Those employing this table are assumed to fall under the IPCC definitions of the “Energy Industry” or “Manufacturing Industries and Construction”. In all fuels except for coal the values for these two categories are identical. For coal combustion, those who fall within the IPCC “Energy Industry” category may employ a value of 1g of CH_4 /mmBtu.

[75 FR page 79154, Dec. 17, 2010; 78 FR page 71952, Nov. 29, 2013]

ISSN 2167-8065

Federal Environment and Safety Codified Regulations
TITLE 40—Protection of Environment
PART 98—MANDATORY GREENHOUSE GAS REPORTING
SUBPART C—General Stationary Fuel Combustion Sources

Table C-1 to Subpart C of Part 98 —Default CO_2 Emission Factors and High Heat Values for Various Types of Fuel

Fuel type	Default high heat value	Default CO_2 emission factor
Coal and coke	mmBtu/short ton	kg CO_2 /mmBtu
Anthracite	25.09	103.69
Bituminous	24.93	93.28
Subbituminous	17.25	97.17
Lignite	14.21	97.72
Coal Coke	24.80	113.67
Mixed (Commercial sector)	21.39	94.27
Mixed (Industrial coking)	26.28	93.90
Mixed (Industrial sector)	22.35	94.67
Mixed (Electric Power sector)	19.73	95.52
Natural gas	mmBtu/scf	kg CO_2 /mmBtu
(Weighted U.S. Average)	1.026×10^{-3}	53.06
Petroleum products	mmBtu/gallon	kg CO_2 /mmBtu
Distillate Fuel Oil No. 1	0.139	73.25
Distillate Fuel Oil No. 2	0.138	73.96
Distillate Fuel Oil No. 4	0.146	75.04
Residual Fuel Oil No. 5	0.140	72.93
Residual Fuel Oil No. 6	0.150	75.10
Used Oil	0.138	74.00
Kerosene	0.135	75.20
Liquefied petroleum gases (LPG) [1]	0.092	61.71
Propane [1]	0.091	62.87
Propylene [2]	0.091	67.77
Ethane [1]	0.068	59.60
Ethanol	0.084	68.44
Ethylene [2]	0.058	65.96
Isobutane [1]	0.099	64.94
Isobutylene [1]	0.103	68.86
Butane [1]	0.103	64.77
Butylene [1]	0.105	68.72
Naphtha (<401 deg F)	0.125	68.02
Natural Gasoline	0.110	66.88
Other Oil (>401 deg F)	0.139	76.22

Pentanes Plus	0.110	70.02
Petrochemical Feedstocks	0.125	71.02
Petroleum Coke	0.143	102.41
Special Naphtha	0.125	72.34
Unfinished Oils	0.139	74.54
Heavy Gas Oils	0.148	74.92
Lubricants	0.144	74.27
Motor Gasoline	0.125	70.22
Aviation Gasoline	0.120	69.25
Kerosene-Type Jet Fuel	0.135	72.22
Asphalt and Road Oil	0.158	75.36
Crude Oil	0.138	74.54
Other fuels—solid	mmBtu/short ton	kg CO_2 /mmBtu
Municipal Solid Waste	9.95 [3]	90.7
Tires	28.00	85.97
Plastics	38.00	75.00
Petroleum Coke	30.00	102.41
Other fuels—gaseous	mmBtu/scf	kg CO_2 /mmBtu
Blast Furnace Gas	0.092×10^{-3}	274.32
Coke Oven Gas	0.599×10^{-3}	46.85
Propane Gas	2.516×10^{-3}	61.46
Fuel Gas [4]	1.388×10^{-3}	59.00
Biomass fuels—solid	mmBtu/short ton	kg CO_2 /mmBtu
Wood and Wood Residuals (dry basis) [5]	17.48	93.80
Agricultural Byproducts	8.25	118.17
Peat	8.00	111.84
Solid Byproducts	10.39	105.51
Biomass fuels—gaseous	mmBtu/scf	kg CO_2 /mmBtu
Landfill Gas	0.485×10^{-3}	52.07
Other Biomass Gases	0.655×10^{-3}	52.07
Biomass Fuels—Liquid	mmBtu/gallon	kg CO_2 /mmBtu
Ethanol	0.084	68.44
Biodiesel (100%)	0.128	73.84
Rendered Animal Fat	0.125	71.06
Vegetable Oil	0.120	81.55

[1] The HHV for components of LPG determined at 60 °F and saturation pressure with the exception of ethylene.

[2] Ethylene HHV determined at 41 °F (5 °C) and saturation pressure.

[3] Use of this default HHV is allowed only for: (a) Units that combust MSW, do not generate steam, and are allowed to use Tier 1; (b) units that derive no more than 10 percent of their annual heat input from MSW and/or tires; and (c) small batch incinerators that combust no more than 1,000 tons of MSW per year.

[4] Reporters subject to subpart X of this part that are complying with § 98.243(d) or subpart Y of this part may only use the default HHV and the default CO_2 emission factor for fuel gas combustion under the conditions prescribed in § 98.243(d)(2)(i) and (d)(2)(ii) and § 98.252(a)(1) and (a)(2), respectively. Otherwise, reporters subject to subpart X or subpart Y shall use either Tier 3 (Equation C-5) or Tier 4.

[5] Use the following formula to calculate a wet basis HHV for use in Equation C-1: $HHV_w = ((100 - M)/100)*HHV_d$ where HHV_w = wet basis HHV, M = moisture content (percent) and HHV_d = dry basis HHV from Table C-1.

[78 FR page 71950, Nov. 29, 2013]

ISSN 2167-8065

PERFORMANCE DATA [RRA07115]

JULY 06, 2016

For Help Desk Phone Numbers Click here

Perf No: DM7687

Change Level: 08

General | Heat Rejection | Emissions | Regulatory | Altitude Derate | Cross Reference

View PDF

SALES MODEL:	C13	**COMBUSTION:**	DI
ENGINE POWER (BHP):	440	**ENGINE SPEED (RPM):**	2,100
PEAK TORQUE (FT-LB):	1,482.5	**PEAK TORQUE SPEED (RPM):**	1,400
COMPRESSION RATIO:	17.3	**TORQUE RISE (%):**	35
RATING LEVEL:	INDUSTRIAL C - INTERMITTENT	**ASPIRATION:**	TA
PUMP QUANTITY:	1	**AFTERCOOLER TYPE:**	ATAAC
FUEL TYPE:	DIESEL	**AFTERCOOLER CIRCUIT TYPE:**	JW+OC, ATAAC
MANIFOLD TYPE:	DRY	**INLET MANIFOLD AIR TEMP (F):**	120
GOVERNOR TYPE:	ELEC	**JACKET WATER TEMP (F):**	192.2
INJECTOR TYPE:	EUI	**TURBO CONFIGURATION:**	SINGLE
REF EXH STACK DIAMETER (IN):	5	**TURBO QUANTITY:**	1
MAX OPERATING ALTITUDE (FT):	2,349	**TURBOCHARGER MODEL:**	GTA4502BS 1.33 A/R
		CERTIFICATION YEAR:	2005
		PISTON SPD @ RATED ENG SPD (FT/MIN):	2,163.4

INDUSTRY	SUB INDUSTRY	APPLICATION
INDUSTRIAL	AGRICULTURE	INDUSTRIAL
OIL AND GAS	WELL SERVICING	INDUSTRIAL
OIL AND GAS	LAND PRODUCTION	INDUSTRIAL
INDUSTRIAL	CONSTRUCTION	INDUSTRIAL
INDUSTRIAL	MATERIAL HANDLING	INDUSTRIAL
INDUSTRIAL	MINING	INDUSTRIAL
INDUSTRIAL	GENERAL INDUSTRIAL	INDUSTRIAL
INDUSTRIAL	FORESTRY	INDUSTRIAL

General Performance Data Top

ENGINE SPEED	ENGINE POWER	ENGINE TORQUE	BRAKE MEAN EFF PRES (BMEP)	BRAKE SPEC FUEL CONSUMPTN (BSFC)	VOL FUEL CONSUMPTN (VFC)	INLET MFLD PRES	INLET MFLD TEMP	EXH MFLD TEMP	EXH MFLD PRES	ENGINE OUTLET TEMP
RPM	BHP	LB-FT	PSI	LB/BHP-HR	GAL/HR	IN-HG	DEG F	DEG F	IN-HG	DEG F
2,100	440	1,101	218	0.358	22.7	47.9	120.8	1,170.3	43.4	925.2
2,000	440	1,156	228	0.355	22.4	47.8	112.0	1,137.2	41.3	833.9
1,900	440	1,217	240	0.350	22.1	48.9	114.2	1,159.8	39.5	896.8
1,800	440	1,284	254	0.346	21.9	50.1	114.7	1,180.9	38.2	944.2
1,700	435	1,345	266	0.347	21.7	51.0	114.8	1,197.5	36.4	972.4
1,600	426	1,399	276	0.342	20.9	50.7	112.8	1,201.2	34.2	977.9
1,500	413	1,446	286	0.338	20.1	51.1	109.2	1,192.1	32.6	961.2
1,400	395	1,484	293	0.336	19.2	50.7	107.1	1,196.9	30.3	974.3
1,300	362	1,464	289	0.335	17.5	49.3	103.6	1,174.3	27.8	959.7
1,200	327	1,431	283	0.330	15.6	42.4	100.3	1,188.8	22.5	973.8
1,100	277	1,321	261	0.333	13.4	33.4	93.2	1,227.3	16.6	1,026.9

1,000	231	1,211	239	0.322	10.7	21.0	86.2	1,174.5	10.1	1,015.9
900	183	1,068	211	0.339	8.8	13.9	85.2	1,160.0	6.8	1,009.4
700	117	880	174	0.365	6.2	6.2	83.7	1,164.1	3.7	1,011.1

ENGINE SPEED	ENGINE POWER	COMPRESSOR OUTLET PRES	COMPRESSOR OUTLET TEMP	WET INLET AIR VOL FLOW RATE	ENGINE OUTLET WET EXH GAS VOL FLOW RATE	WET INLET AIR MASS FLOW RATE	WET EXH GAS MASS FLOW RATE	WET EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)	DRY EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)
RPM	BHP	IN-HG	DEG F	CFM	CFM	LB/HR	LB/HR	FT3/MIN	FT3/MIN
2,100	440	52	323.5	1,028.9	2,723.2	4,434.4	4,593.3	966.8	886.2
2,000	440	51	309.2	1,004.0	2,481.1	4,323.1	4,480.2	943.0	863.1
1,900	440	52	316.1	970.4	2,514.2	4,175.0	4,329.4	911.3	833.0
1,800	440	53	322.0	942.7	2,528.9	4,054.8	4,207.8	885.7	808.8
1,700	435	54	323.5	911.3	2,490.8	3,910.7	4,062.6	855.1	779.1
1,600	426	53	322.5	858.5	2,353.2	3,676.9	3,823.8	804.8	731.9
1,500	413	53	323.3	814.1	2,205.4	3,484.6	3,625.7	763.2	693.1
1,400	395	53	325.1	763.5	2,084.5	3,261.4	3,395.5	714.7	648.3
1,300	362	51	322.0	705.2	1,900.6	3,005.6	3,128.0	658.4	597.7
1,200	327	44	305.3	600.3	1,632.3	2,550.9	2,659.9	559.9	506.2
1,100	277	34	271.1	484.5	1,366.8	2,054.0	2,147.5	452.0	406.4
1,000	231	22	212.8	349.4	981.5	1,478.5	1,553.8	327.0	291.0
900	183	14	186.1	272.6	763.1	1,152.1	1,213.4	255.4	226.2
700	117	7	151.2	167.9	473.9	709.1	752.6	158.4	138.1

Heat Rejection Data Top

ENGINE SPEED	ENGINE POWER	REJECTION TO JACKET WATER	REJECTION TO ATMOSPHERE	REJECTION TO EXH	EXHUAST RECOVERY TO 350F	FROM OIL COOLER	FROM AFTERCOOLER	WORK ENERGY	LOW HEAT VALUE ENERGY	HIGH HEAT VALUE ENERGY
RPM	BHP	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN
2,100	440	7,091	2,411	19,708	11,214	2,574	3,599	18,664	48,321	51,474
2,000	440	6,933	4,553	17,449	9,150	2,551	3,414	18,664	47,888	51,012
1,900	440	6,806	3,342	18,141	10,041	2,516	3,375	18,664	47,245	50,328
1,800	440	6,713	2,396	18,580	10,647	2,486	3,366	18,664	46,674	49,720
1,700	435	6,884	2,121	18,561	10,801	2,465	3,268	18,465	46,279	49,299
1,600	426	6,566	2,149	17,648	10,270	2,376	3,089	18,067	44,608	47,519
1,500	413	6,312	2,264	16,492	9,474	2,279	2,988	17,516	42,781	45,572
1,400	395	5,989	2,052	15,699	9,077	2,168	2,846	16,771	40,700	43,356
1,300	362	5,517	1,869	14,229	8,154	1,981	2,629	15,372	37,189	39,615
1,200	327	5,120	1,749	12,383	7,116	1,760	2,094	13,865	33,053	35,210
1,100	277	4,781	1,451	10,639	6,274	1,503	1,463	11,732	28,225	30,066

Emissions Data Top

Units Filter All Units

RATED SPEED POTENTIAL SITE VARIATION: 2100 RPM

ENGINE POWER		BHP	440	330	220	110	44.0
PERCENT LOAD		**%**	**100**	**75**	**50**	**25**	**10**
TOTAL NOX (AS NO2)		G/HR	1,346	816	436	209	145
TOTAL CO		G/HR	1,103	913	284	208	424
TOTAL HC		G/HR	37	44	92	96	77
PART MATTER		G/HR	85.9	63.7	48.4	61.3	82.7
TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	1,365.7	1,028.3	750.5	699.4	776.8
TOTAL CO	(CORR 5% O2)	MG/NM3	1,135.0	1,149.6	496.0	1,195.3	2,255.9
TOTAL HC	(CORR 5% O2)	MG/NM3	32.3	48.3	136.8	264.8	360.5
PART MATTER	(CORR 5% O2)	MG/NM3	73.7	69.3	74.3	234.5	404.4
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	665	501	366	341	378

TOTAL CO	(CORR 5% O2)	PPM	908	920	397	956	1,805
TOTAL HC	(CORR 5% O2)	PPM	60	90	255	494	673
TOTAL NOX (AS NO2)		G/HP-HR	3.08	2.49	2.00	1.91	3.32
TOTAL CO		G/HP-HR	2.53	2.79	1.30	1.90	9.67
TOTAL HC		G/HP-HR	0.08	0.13	0.42	0.87	1.76
PART MATTER		G/HP-HR	0.20	0.19	0.22	0.56	1.89
TOTAL NOX (AS NO2)		LB/HR	2.97	1.80	0.96	0.46	0.32
TOTAL CO		LB/HR	2.43	2.01	0.63	0.46	0.93
TOTAL HC		LB/HR	0.08	0.10	0.20	0.21	0.17
PART MATTER		LB/HR	0.19	0.14	0.11	0.14	0.18

RATED SPEED NOMINAL DATA: 2100 RPM

ENGINE POWER		**BHP**	**440**	**330**	**220**	**110**	**44.0**
PERCENT LOAD		**%**	**100**	**75**	**50**	**25**	**10**
TOTAL NOX (AS NO2)		G/HR	1,246	756	404	193	135
TOTAL CO		G/HR	590	488	152	111	227
TOTAL HC		G/HR	20	23	48	51	41
TOTAL CO2		KG/HR	233	186	136	80	42
PART MATTER		G/HR	44.0	32.7	24.8	31.5	42.4
TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	1,264.5	952.2	694.9	647.6	719.2
TOTAL CO	(CORR 5% O2)	MG/NM3	606.9	614.8	265.2	639.2	1,206.3
TOTAL HC	(CORR 5% O2)	MG/NM3	17.1	25.6	72.4	140.1	190.7
PART MATTER	(CORR 5% O2)	MG/NM3	37.8	35.5	38.1	120.3	207.4
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	616	464	338	315	350
TOTAL CO	(CORR 5% O2)	PPM	486	492	212	511	965
TOTAL HC	(CORR 5% O2)	PPM	32	48	135	262	356
TOTAL NOX (AS NO2)		G/HP-HR	2.86	2.31	1.85	1.77	3.07
TOTAL CO		G/HP-HR	1.35	1.49	0.70	1.02	5.17
TOTAL HC		G/HP-HR	0.04	0.07	0.22	0.46	0.93
PART MATTER		G/HP-HR	0.10	0.10	0.11	0.29	0.97
TOTAL NOX (AS NO2)		LB/HR	2.75	1.67	0.89	0.43	0.30
TOTAL CO		LB/HR	1.30	1.08	0.33	0.25	0.50
TOTAL HC		LB/HR	0.04	0.05	0.11	0.11	0.09
TOTAL CO2		LB/HR	513	411	300	175	93
PART MATTER		LB/HR	0.10	0.07	0.05	0.07	0.09
OXYGEN IN EXH		%	10.5	12.2	14.2	16.0	17.0
DRY SMOKE OPACITY		%	0.9	0.8	0.6	1.3	2.6
BOSCH SMOKE NUMBER			0.62	0.50	0.29	0.87	1.58

Regulatory Information Top

EPA TIER 3 **2005 - 2010**

GASEOUS EMISSIONS DATA MEASUREMENTS PROVIDED TO THE EPA ARE CONSISTENT WITH THOSE DESCRIBED IN EPA 40 CFR PART 89 SUBPART D AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. THE "MAX LIMITS" SHOWN BELOW ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIANCE WITH THE NON-ROAD REGULATIONS.

Locality	Agency	Regulation	Tier/Stage	Max Limits - G/BKW - HR
U.S. (INCL CALIF)	EPA	NON-ROAD	TIER 3	CO: 3.5 NOx + HC: 4.0 PM: 0.20

EU STAGE IIIA **2006 - 2010**

GASEOUS EMISSION DATA MEASUREMENTS ARE CONSISTENT WITH THOSE DESCRIBED IN EU 97/68/EC, ECE REGULATION NO. 96 AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. GASEOUS EMISSION VALUES ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIANCE WITH THE NON-ROAD REGULATIONS.

Locality	Agency	Regulation	Tier/Stage	Max Limits - G/BKW - HR
EUROPE	EU	NON-ROAD	STAGE IIIA	CO: 3.5 NOx + HC: 4.0 PM: 0.20

IMO II	**2011 - ----**

GASEOUS EMISSIONS DATA MEASUREMENTS ARE CONSISTENT WITH THOSE DESCRIBED IN REGULATION 13 OF REVISED ANNEX VI OF MARPOL 73/78 AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. THIS ENGINE CONFORMS TO INTERNATIONAL MARINE ORGANIZATION'S (IMO) MARINE COMPRESSION-IGNITION EMISSION REGULATIONS.

Altitude Derate Data Top

ALTITUDE CORRECTED POWER CAPABILITY (BHP)

AMBIENT OPERATING TEMP (F)	50	60	70	80	90	100	110	120	130	NORMAL
ALTITUDE (FT)										
0	440	440	440	440	440	440	440	440	438	440
1,000	440	440	440	440	440	440	436	429	422	440
2,000	440	440	440	440	435	428	420	413	406	440
3,000	440	440	435	427	419	412	404	397	391	437
4,000	435	426	418	411	403	396	389	382	376	423
5,000	418	410	402	395	388	381	374	368	361	409
6,000	402	394	387	380	373	366	360	353	347	396
7,000	386	379	372	365	358	352	346	340	334	384
8,000	371	364	357	351	344	338	332	326	321	371
9,000	356	350	343	337	331	325	319	313	308	359
10,000	342	336	329	323	317	312	306	301	296	347
11,000	328	322	316	310	304	299	294	289	284	335
12,000	315	309	303	297	292	287	282	277	272	324
13,000	302	296	291	285	280	275	270	266	261	313
14,000	289	284	279	273	268	264	259	255	250	302
15,000	277	272	267	262	257	253	248	244	240	292

Cross Reference Top

Engine Arrangement

Arrangement Number	Effective Serial Number	Engineering Model	Engineering Model Version
2413804	LGK21070	E707	-
3605981	RRA00001	E707	-

Test Specification Data

Test Spec	Setting	Effective Serial Number	Engine Arrangement
0K5712	PP5378	LGK21070	2413804
0K5712	PP5378	RRA00001	3605981

Table 3.3-2. SPECIATED ORGANIC COMPOUND EMISSION FACTORS FOR UNCONTROLLED DIESEL ENGINES[a]

EMISSION FACTOR RATING: E

Pollutant	Emission Factor (Fuel Input) (lb/MMBtu)
Benzene[b]	9.33 E-04
Toluene[b]	4.09 E-04
Xylenes[b]	2.85 E-04
Propylene	2.58 E-03
1,3-Butadiene[b,c]	<3.91 E-05
Formaldehyde[b]	1.18 E-03
Acetaldehyde[b]	7.67 E-04
Acrolein[b]	<9.25 E-05
Polycyclic aromatic hydrocarbons (PAH)	
Naphthalene[b]	8.48 E-05
Acenaphthylene	<5.06 E-06
Acenaphthene	<1.42 E-06
Fluorene	2.92 E-05
Phenanthrene	2.94 E-05
Anthracene	1.87 E-06
Fluoranthene	7.61 E-06
Pyrene	4.78 E-06
Benzo(a)anthracene	1.68 E-06
Chrysene	3.53 E-07
Benzo(b)fluoranthene	<9.91 E-08
Benzo(k)fluoranthene	<1.55 E-07
Benzo(a)pyrene	<1.88 E-07
Indeno(1,2,3-cd)pyrene	<3.75 E-07
Dibenz(a,h)anthracene	<5.83 E-07
Benzo(g,h,l)perylene	<4.89 E-07
TOTAL PAH	1.68 E-04

[a] Based on the uncontrolled levels of 2 diesel engines from References 6-7. Source Classification Codes 2-02-001-02, 2-03-001-01. To convert from lb/MMBtu to ng/J, multiply by 430.
[b] Hazardous air pollutant listed in the *Clean Air Act*.
[c] Based on data from 1 engine.

Policy: CARB Emission Factors for CI Diesel Engines – Percent HC in Relation to NMHC + NOx

Policy

When the non-methane hydrocarbon (NMHC) and nitrogen oxide (NOx) emission factor is combined, assume a breakdown of 5% and 95%, respectively.

Effective date

June 28, 2004

Definitions

The following is a list of associated definitions.

- ***CI Engine*** – Compression Ignition Engine is an internal combustion engine with operating characteristics significantly similar to the theoretical diesel combustion cycle.
- ***HC*** – Organic compound consistently entirely of hydrogen and carbon.
- ***NMHC*** – Non-Methane Hydrocarbon is the sum of all hydrocarbon air pollutants except methane.
- ***NOx*** – Nitrogen Oxides are compounds of nitric oxide (NO), nitrogen dioxide (NO_2), and other oxides of nitrogen, which are typically created during combustion processes.

Contact

Randy Frazier, x4672

Document Control

Version	Revised By	Description	Date
1.1	HL	New Policy: CARB Emission Factors – Percent HC in Relation to NMHC + NOx	06/28/04
1.2	MCL	Mapping of Policy	3/13/08

Approval

Name & Title	Signature	Date
Brian Bateman, Director of Engineering	**Signed by Brian Bateman**	2/28/2008

	NOx ppm	NOx ppm Corrected	Nox ppm Corrected.7d avg	Nox ppm Corrected.365davg	O2	Flowrate dscfm	7 day rolling
1-Jan-14	47.63	59.09	66.58	63.59	4.04	24115.73	8.02
2-Jan-14	46.59	57.95	64.19	63.58	4.10	24414.28	7.93
3-Jan-14	40.76	50.08	58.34	63.50	3.89	24588.38	7.67
4-Jan-14	34.98	42.68	55.21	63.44	3.78	25914.19	7.54
5-Jan-14	33.88	43.61	51.74	63.37	4.72	30646.71	7.62
6-Jan-14	35.60	45.33	50.92	63.31	4.49	24466.86	7.39
7-Jan-14	37.19	47.87	50.05	63.24	4.61	24485.31	7.21
8-Jan-14	35.31	44.89	48.82	63.21	4.42	24191.47	6.90
9-Jan-14	37.80	48.36	46.86	63.15	4.54	24278.26	6.60
10-Jan-14	45.04	56.60	46.70	63.11	4.23	24383.68	6.38
11-Jan-14	50.39	64.88	48.89	63.07	4.64	23706.53	6.19
12-Jan-14	40.34	49.73	51.99	63.04	3.87	24314.46	5.96
13-Jan-14	37.44	46.14	52.22	62.98	3.92	24042.16	5.97
14-Jan-14	39.75	49.44	52.27	62.90	4.09	25494.38	6.04
15-Jan-14	40.09	50.93	52.17	62.87	4.43	28427.52	6.26
16-Jan-14	41.57	52.34	52.64	62.88	4.28	29551.13	6.56
17-Jan-14	42.49	53.90	52.60	62.84	4.41	29380.79	6.85
18-Jan-14	44.64	56.73	51.96	62.80	4.44	29327.58	7.11
19-Jan-14	45.47	57.52	51.63	62.78	4.36	29504.67	7.29
20-Jan-14	49.16	62.34	53.43	62.78	4.41	29421.93	7.52
21-Jan-14	51.69	66.52	55.71	62.78	4.63	28941.08	7.72
22-Jan-14	42.30	56.81	57.74	62.79	5.28	28540.90	7.84
23-Jan-14	41.22	54.67	58.20	62.71	5.14	27796.03	7.88
24-Jan-14	45.36	60.98	58.87	62.65	5.35	27791.14	7.95
25-Jan-14	43.34	57.36	59.56	62.61	5.09	28589.34	8.07
26-Jan-14	45.23	59.17	59.55	62.60	4.92	28663.18	8.20
27-Jan-14	47.41	62.30	59.72	62.61	5.00	28724.38	8.31
28-Jan-14	46.97	61.94	59.49	62.60	5.05	29231.90	8.40
29-Jan-14	50.31	67.69	59.35	62.59	5.32	29059.51	8.45
30-Jan-14	52.03	70.46	62.07	62.56	5.40	28775.09	8.57
31-Jan-14	38.22	49.16	61.94	62.45	4.64	29731.23	8.72
1-Feb-14	41.76	52.34	60.72	62.35	4.18	40435.55	9.26
2-Feb-14	40.71	52.28	60.15	62.30	4.61	28607.19	9.27
3-Feb-14	45.22	57.73	59.03	62.24	4.52	29725.39	9.29
4-Feb-14	54.74	68.74	59.51	62.21	4.13	29331.86	9.30
5-Feb-14	48.18	66.58	60.05	62.15	5.70	40643.98	9.81
6-Feb-14	41.17	59.68	58.43	62.09	6.47	29658.38	9.77
7-Feb-14	41.15	57.05	58.57	62.02	5.81	27158.41	9.59
8-Feb-14	44.72	54.98	59.21	61.96	3.97	25685.99	8.93
9-Feb-14	53.58	64.48	60.28	61.90	3.52	25039.23	8.78
10-Feb-14	54.81	66.27	62.07	61.87	3.59	25101.68	8.63
11-Feb-14	50.94	61.56	62.27	61.83	3.55	24664.38	8.49
12-Feb-14	41.80	49.70	60.22	61.73	3.32	25085.24	7.82
13-Feb-14	44.30	53.61	58.59	61.65	3.62	24637.30	7.61
14-Feb-14	46.56	68.23	59.37	61.64	7.04	35600.64	7.99
15-Feb-14	56.75	71.68	61.64	61.62	4.12	40089.75	8.67
16-Feb-14	54.26	65.77	62.62	61.59	3.61	24732.91	8.69
17-Feb-14	41.39	48.50	61.21	61.52	3.03	24481.34	8.65
18-Feb-14	45.86	53.74	58.93	61.46	3.06	25211.91	8.62
19-Feb-14	48.80	56.96	59.31	61.39	2.98	25660.64	8.62
20-Feb-14	48.70	57.62	60.24	61.33	3.24	26735.45	8.74
21-Feb-14	43.13	50.90	58.74	61.27	3.16	25419.95	8.30
22-Feb-14	50.13	59.76	56.69	61.24	3.36	25454.71	7.57
23-Feb-14	48.61	58.21	55.26	61.20	3.44	25222.53	7.46
24-Feb-14	44.03	52.82	55.38	61.17	3.48	25231.42	7.38
25-Feb-14	41.09	49.07	55.47	61.09	3.38	25252.49	7.32
26-Feb-14	43.97	52.95	54.65	60.99	3.54	25284.51	7.22
27-Feb-14	40.60	47.94	53.75	60.95	3.18	25804.91	7.06
28-Feb-14	39.34	48.33	53.25	60.95	3.86	32608.63	7.24
1-Mar-14	41.73	48.97	51.32	60.87	3.01	30150.50	7.31
2-Mar-14	59.63	72.65	52.14	60.86	3.73	24998.59	7.25

	NOx ppm	NOx ppm Corrected	Nox ppm Corrected.7d avg	Nox ppm Corrected.365davg	O2	Flowrate dscfm	7 day rolling
3-Mar-14	59.88	73.64	54.91	60.89	3.90	23958.95	7.19
4-Mar-14	50.66	61.00	57.34	60.90	3.52	24112.86	7.18
5-Mar-14	48.11	58.63	58.56	60.88	3.81	28605.05	7.39
6-Mar-14	45.74	53.68	59.25	60.84	3.08	23665.24	7.40
7-Mar-14	48.35	57.63	60.10	60.76	3.31	23656.47	7.17
8-Mar-14	52.43	63.56	62.38	60.68	3.64	23067.23	7.09
9-Mar-14	47.47	57.42	62.35	60.60	3.59	27300.45	7.38
10-Mar-14	47.40	57.34	59.67	60.51	3.58	25052.46	7.51
11-Mar-14	49.97	59.67	58.16	60.43	3.37	25034.75	7.56
12-Mar-14	53.75	64.87	58.66	60.36	3.55	23609.20	7.35
13-Mar-14	49.53	58.87	59.27	60.29	3.30	23619.75	7.35
14-Mar-14	53.29	64.07	60.19	60.24	3.49	23778.02	7.36
15-Mar-14	45.41	55.21	60.45	60.16	3.63	24190.88	7.37
16-Mar-14	45.67	54.75	59.12	60.07	3.42	24054.87	7.17
17-Mar-14	48.72	58.20	58.94	59.97	3.38	23818.03	7.11
18-Mar-14	42.88	51.12	58.47	59.84	3.33	25067.94	7.12
19-Mar-14	52.06	63.60	57.77	59.72	3.76	24591.74	7.14
20-Mar-14	54.86	66.96	58.60	59.63	3.75	24759.76	7.18
21-Mar-14	55.08	67.23	59.35	59.51	3.75	24896.38	7.21
22-Mar-14	56.44	69.03	60.39	59.40	3.78	24306.74	7.21
23-Mar-14	50.70	61.24	61.98	59.31	3.57	23438.60	7.24
24-Mar-14	50.46	61.14	63.19	59.23	3.58	23459.63	7.29
25-Mar-14	46.71	55.65	63.14	59.16	3.30	23996.89	7.33
26-Mar-14	50.97	59.92	63.42	59.11	3.08	24668.87	7.43
27-Mar-14	52.55	61.85	62.47	59.10	3.09	24986.49	7.51
28-Mar-14	54.81	64.65	62.14	59.09	3.15	24766.74	7.55
29-Mar-14	51.02	60.66	61.35	59.10	3.27	24423.04	7.57
30-Mar-14	51.63	62.11	60.87	59.07	3.48	24398.45	7.60
31-Mar-14	57.25	69.96	61.29	59.02	3.74	24900.15	7.63
1-Apr-14	45.65	54.79	62.35	59.00	3.44	24850.18	7.65
2-Apr-14	44.21	54.31	61.60	58.92	3.85	25187.95	7.64
3-Apr-14	47.59	60.04	61.14	58.84	4.29	25286.78	7.63
4-Apr-14	52.04	64.50	60.81	58.80	4.06	32543.64	7.95
5-Apr-14	52.20	65.20	61.21	58.78	4.20	23269.18	7.89
6-Apr-14	50.01	64.38	61.93	58.76	4.62	23325.77	7.87
7-Apr-14	45.95	57.68	60.72	58.66	4.21	23279.47	7.79
8-Apr-14	51.68	65.50	61.01	58.57	4.38	22975.44	7.68
9-Apr-14	56.50	68.84	62.84	58.50	3.72	23254.56	7.62
10-Apr-14	56.14	69.81	64.40	58.48	4.08	23583.07	7.60
11-Apr-14	61.69	77.21	65.96	58.48	4.18	23583.33	7.29
12-Apr-14	64.78	83.41	68.22	58.52	4.63	26434.86	7.56
13-Apr-14	49.71	63.89	69.26	58.53	4.62	31615.30	8.10
14-Apr-14	44.70	57.43	69.72	58.51	4.58	23190.09	8.24
15-Apr-14	43.33	53.92	68.65	58.46	4.09	23188.87	8.38
16-Apr-14	45.58	57.18	66.78	58.39	4.22	23135.94	8.44
17-Apr-14	45.66	57.47	65.64	58.34	4.25	22909.99	8.43
18-Apr-14	37.68	46.95	62.18	58.24	4.11	23501.87	8.36
19-Apr-14	43.96	54.68	58.00	58.20	4.10	23535.14	8.05
20-Apr-14	49.89	60.50	55.63	58.23	3.65	23741.92	7.43
21-Apr-14	49.74	60.41	55.78	58.25	3.67	23364.68	7.20
22-Apr-14	46.45	55.46	55.89	58.24	3.38	23791.38	7.02
23-Apr-14	54.58	66.39	56.70	58.23	3.70	24396.90	6.90
24-Apr-14	55.69	71.31	58.13	58.20	4.59	23845.61	6.82
25-Apr-14	54.90	68.28	61.14	58.15	4.08	23821.83	6.81
26-Apr-14	50.29	61.11	63.09	58.10	3.70	24612.39	6.95
27-Apr-14	47.18	57.01	63.06	58.09	3.59	24299.77	7.10
28-Apr-14	51.00	62.82	62.76	58.12	3.93	24327.06	7.26
29-Apr-14	51.23	62.73	63.90	58.11	3.83	23597.72	7.38
30-Apr-14	53.84	66.88	64.39	58.07	4.07	23269.17	7.47
1-May-14	50.96	62.33	63.70	58.03	3.80	23368.52	7.54
2-May-14	52.24	63.84	62.53	57.97	3.80	23450.32	7.55
3-May-14	51.74	65.02	62.48	57.93	4.27	23961.44	7.51

	NOx ppm	NOx ppm Corrected	Nox ppm Corrected.7d avg	Nox ppm Corrected.365davg	O2	Flowrate dscfm	7 day rolling
4-May-14	53.47	66.19	63.75	57.88	4.01	23802.98	7.50
5-May-14	52.36	64.43	64.45	57.88	3.89	23837.67	7.50
6-May-14	54.88	67.67	64.62	57.88	3.93	24268.11	7.55
7-May-14	55.55	69.25	65.36	57.88	4.12	24071.37	7.60
8-May-14	53.43	66.22	65.75	57.88	4.02	23898.41	7.66
9-May-14	48.25	58.79	65.94	57.89	3.72	23502.19	7.72
10-May-14	47.06	56.53	64.82	57.86	3.48	23854.10	7.75
11-May-14	49.61	59.70	63.55	57.86	3.51	24048.35	7.76
12-May-14	55.32	68.90	63.33	57.90	4.09	24008.11	7.75
13-May-14	59.38	77.49	64.32	57.97	4.85	22949.13	7.68
14-May-14	53.06	71.14	65.97	58.06	5.16	21924.19	7.59
15-May-14	46.76	59.09	64.72	58.09	4.34	22975.07	7.53
16-May-14	50.30	63.07	64.73	58.13	4.21	23747.68	7.52
17-May-14	47.65	59.69	65.28	58.16	4.20	23599.28	7.52
18-May-14	55.18	70.38	66.45	58.22	4.47	22510.33	7.50
19-May-14	45.34	55.84	66.50	58.27	3.88	23435.11	7.52
20-May-14	46.75	57.41	64.04	58.29	3.86	23780.87	7.56
21-May-14	44.98	55.19	60.62	58.30	3.85	24000.99	7.56
22-May-14	48.30	59.14	60.34	58.28	3.82	23666.64	7.52
23-May-14	48.69	59.86	59.84	58.23	3.89	23477.37	7.43
24-May-14	49.79	61.44	59.81	58.22	3.95	23498.66	7.33
25-May-14	45.90	56.34	58.92	58.23	3.86	23685.74	7.26
26-May-14	42.13	51.49	57.56	58.25	3.76	23401.32	7.11
27-May-14	50.48	61.22	57.23	58.25	3.71	23207.20	6.97
28-May-14	55.56	67.26	58.48	58.27	3.69	23661.06	6.92
29-May-14	47.19	56.83	59.11	58.29	3.52	23477.20	6.89
30-May-14	47.29	56.78	58.75	58.30	3.46	23614.30	6.88
31-May-14	53.33	64.83	59.00	58.33	3.70	24217.09	6.89
1-Jun-14	51.58	62.79	59.58	58.35	3.73	24420.13	6.94
2-Jun-14	52.44	64.02	60.99	58.35	3.77	24077.39	7.02
3-Jun-14	54.44	67.47	62.62	58.33	4.00	24279.30	7.16
4-Jun-14	53.86	66.76	62.95	58.32	3.98	24192.20	7.26
5-Jun-14	55.58	69.12	63.75	58.33	4.04	24221.67	7.37
6-Jun-14	55.35	67.59	65.45	58.32	3.74	24184.07	7.51
7-Jun-14	52.35	63.58	66.10	58.33	3.57	23223.46	7.59
8-Jun-14	42.95	50.54	64.83	58.32	3.09	23849.76	7.65
9-Jun-14	47.04	56.16	63.56	58.32	3.34	23914.02	7.69
10-Jun-14	48.34	58.29	62.43	58.33	3.50	23679.90	7.66
11-Jun-14	48.13	57.30	61.15	58.34	3.26	24144.76	7.62
12-Jun-14	55.76	68.49	60.72	58.36	3.81	22969.84	7.52
13-Jun-14	43.75	51.88	59.37	58.37	3.19	24058.39	7.41
14-Jun-14	43.65	51.66	56.95	58.36	3.18	24584.63	7.31
15-Jun-14	52.18	62.99	57.40	58.36	3.53	24554.02	7.21
16-Jun-14	59.02	72.41	59.03	58.40	3.80	22957.24	7.10
17-Jun-14	55.03	66.66	61.19	58.45	3.58	22045.34	7.00
18-Jun-14	44.63	53.16	61.36	58.42	3.28	23881.24	7.00
19-Jun-14	47.88	57.83	60.23	58.32	3.51	23812.94	7.02
20-Jun-14	41.94	50.37	59.10	58.20	3.41	23459.40	6.99
21-Jun-14	42.35	50.63	59.49	58.13	3.34	23812.28	7.01
22-Jun-14	46.99	55.88	58.50	58.09	3.28	24040.33	7.00
23-Jun-14	44.72	53.12	56.85	58.06	3.26	24178.39	7.02
24-Jun-14	44.40	52.83	54.34	58.01	3.27	24105.98	6.99
25-Jun-14	50.03	59.75	53.72	57.96	3.35	24250.60	6.87
26-Jun-14	46.57	55.50	54.15	57.91	3.31	24518.58	6.80
27-Jun-14	46.58	55.16	54.51	57.90	3.21	24292.51	6.75
28-Jun-14	43.88	52.05	54.66	57.84	3.24	23999.78	6.68
29-Jun-14	43.92	52.19	54.89	57.74	3.26	24072.38	6.62
30-Jun-14	55.88	72.21	55.21	57.71	4.44	22460.75	6.52
1-Jul-14	52.21	65.10	58.32	57.78	3.97	23224.18	6.55
2-Jul-14	44.94	54.06	58.57	57.79	3.49	23803.10	6.62
3-Jul-14	42.08	50.39	57.46	57.75	3.41	24058.05	6.66
4-Jul-14	44.50	53.08	57.16	57.70	3.33	24056.07	6.69

	NOx ppm	NOx ppm Corrected	Nox ppm Corrected.7d avg	Nox ppm Corrected.365davg	O2	Flowrate dscfm	7 day rolling
5-Jul-14	39.27	46.81	56.73	57.65	3.33	24118.65	6.73
6-Jul-14	39.91	47.55	55.72	57.56	3.31	23883.16	6.74
7-Jul-14	43.25	51.96	54.50	57.50	3.45	23498.71	6.77
8-Jul-14	38.03	45.20	50.95	57.47	3.28	24379.06	6.69
9-Jul-14	40.00	47.61	49.17	57.41	3.31	24875.90	6.57
10-Jul-14	43.78	52.20	49.21	57.40	3.33	24667.78	6.45
11-Jul-14	44.61	53.39	49.29	57.39	3.38	24169.64	6.32
12-Jul-14	43.42	51.78	49.54	57.39	3.34	24110.48	6.19
13-Jul-14	46.47	55.98	50.71	57.38	3.53	23756.27	6.10
14-Jul-14	52.39	64.03	51.89	57.38	3.73	23897.02	6.07
15-Jul-14	55.21	67.28	54.40	57.42	3.70	22730.69	6.07
16-Jul-14	45.19	54.11	57.02	57.46	3.39	26008.25	6.26
17-Jul-14	43.42	49.60	56.51	57.45	2.60	30698.93	6.63
18-Jul-14	53.42	62.62	57.09	57.46	2.99	29672.63	6.99
19-Jul-14	51.49	60.12	58.34	57.49	2.97	29963.20	7.38
20-Jul-14	49.10	57.38	59.25	57.52	2.98	29908.74	7.79
21-Jul-14	46.67	54.59	59.03	57.53	3.00	29598.43	8.15
22-Jul-14	48.62	57.41	57.14	57.52	3.17	29280.34	8.46
23-Jul-14	41.17	48.06	55.90	57.51	2.97	28909.40	8.55
24-Jul-14	42.63	50.21	55.95	57.47	3.11	29508.28	8.49
25-Jul-14	42.43	50.07	55.03	57.47	3.16	29708.68	8.45
26-Jul-14	44.20	51.90	53.51	57.49	3.08	30543.70	8.37
27-Jul-14	44.79	52.48	52.47	57.51	3.03	31420.07	8.28
28-Jul-14	47.35	55.53	52.23	57.51	3.07	30114.61	8.16
29-Jul-14	50.07	58.73	52.40	57.54	3.06	30150.04	8.09
30-Jul-14	52.14	61.98	53.30	57.56	3.27	29896.83	8.08
31-Jul-14	46.89	55.16	54.74	57.56	3.14	29858.25	8.06
1-Aug-14	46.07	54.36	55.48	57.55	3.15	29946.57	8.08
2-Aug-14	44.28	52.17	55.73	57.56	3.15	31111.98	8.15
3-Aug-14	48.43	57.26	56.12	57.58	3.20	31214.99	8.23
4-Aug-14	48.47	57.38	56.51	57.59	3.23	30558.34	8.34
5-Aug-14	51.60	61.63	56.92	57.62	3.31	30513.99	8.45
6-Aug-14	49.04	58.19	57.03	57.65	3.26	29883.85	8.53
7-Aug-14	47.63	56.52	56.84	57.66	3.27	29299.99	8.55
8-Aug-14	48.53	58.32	56.81	57.68	3.42	29777.04	8.57
9-Aug-14	54.81	68.82	58.63	57.69	4.24	29656.37	8.58
10-Aug-14	46.95	56.67	59.94	57.70	3.55	29506.01	8.59
11-Aug-14	47.02	56.11	59.51	57.72	3.35	31222.52	8.68
12-Aug-14	50.59	60.11	59.44	57.73	3.29	30632.98	8.74
13-Aug-14	49.70	58.47	59.25	57.69	3.12	30332.08	8.81
14-Aug-14	46.55	54.89	59.15	57.67	3.14	30875.16	8.92
15-Aug-14	50.20	59.45	59.38	57.65	3.22	30035.90	8.99
16-Aug-14	49.30	58.37	58.50	57.67	3.23	31049.26	9.04
17-Aug-14	46.52	54.93	57.51	57.70	3.16	31110.19	9.06
18-Aug-14	40.62	49.39	57.29	57.72	3.71	30613.56	8.98
19-Aug-14	41.03	48.03	55.65	57.71	3.01	30226.55	8.88
20-Aug-14	42.09	49.25	54.17	57.71	3.00	31415.64	8.82
21-Aug-14	41.87	52.12	53.37	57.71	3.97	32275.95	8.74
22-Aug-14	39.39	48.40	52.23	57.69	3.88	31820.32	8.66
23-Aug-14	42.08	52.03	51.09	57.67	3.97	31064.74	8.49
24-Aug-14	41.74	51.85	50.33	57.65	4.05	31136.99	8.33
25-Aug-14	42.52	52.82	50.20	57.62	4.06	31365.04	8.21
26-Aug-14	44.03	55.04	51.11	57.54	4.14	33811.78	8.24
27-Aug-14	45.47	56.86	52.21	57.49	4.16	39630.53	8.50
28-Aug-14	40.29	49.92	52.58	57.43	3.98	41013.04	8.81
29-Aug-14	35.91	44.38	52.03	57.37	3.96	40083.62	9.11
30-Aug-14	39.41	49.05	51.68	57.38	4.08	39026.34	9.42
31-Aug-14	34.73	42.76	50.84	57.38	3.88	39927.63	9.75
1-Sep-14	37.04	48.41	49.70	57.37	4.87	44687.45	10.21
2-Sep-14	42.56	58.85	49.84	57.38	5.74	35018.25	10.22
3-Sep-14	43.23	59.18	50.51	57.40	5.49	36427.01	10.06
4-Sep-14	39.32	54.76	50.90	57.40	5.68	41306.44	10.02

	NOx ppm	NOx ppm Corrected	Nox ppm Corrected.7d avg	Nox ppm Corrected.365da vg	O2	Flowrate dscfm	7 day rolling
5-Sep-14	37.84	50.06	51.49	57.37	5.04	41142.33	10.04
6-Sep-14	39.53	52.90	52.08	57.36	5.21	40756.84	10.12
7-Sep-14	47.81	63.85	53.74	57.38	5.24	37131.87	10.10
8-Sep-14	49.86	68.12	56.63	57.42	5.56	38518.56	10.07
9-Sep-14	33.47	49.11	58.06	57.48	5.79	71380.95	11.78
10-Sep-14	34.01	40.90	54.90	57.48	3.50	43688.63	12.18
11-Sep-14	46.31	57.97	53.93	57.48	4.15	33202.76	11.96
12-Sep-14	54.43	70.90	55.98	57.47	4.83	32454.35	11.74
13-Sep-14	54.60	69.34	59.03	57.51	4.37	35285.39	11.71
14-Sep-14	45.29	55.01	59.26	57.51	3.66	30896.90	11.59
15-Sep-14	46.79	56.83	58.07	57.51	3.67	31307.75	11.34
16-Sep-14	45.10	54.79	56.84	57.51	3.69	31172.19	9.64
17-Sep-14	45.20	55.91	59.19	57.55	3.99	30665.66	9.23
18-Sep-14	42.35	52.53	59.85	57.58	4.02	30796.73	9.26
19-Sep-14	43.56	54.63	58.47	57.59	4.24	32714.72	9.33
20-Sep-14	41.68	52.95	55.58	57.58	4.42	32217.86	9.12
21-Sep-14	42.11	53.12	54.66	57.58	4.31	31576.10	9.05
22-Sep-14	39.85	49.95	54.03	57.58	4.18	32155.84	8.99
23-Sep-14	42.82	54.09	53.24	57.59	4.32	32263.82	8.95
24-Sep-14	46.32	59.19	53.44	57.53	4.54	32024.91	8.88
25-Sep-14	46.70	58.83	54.26	57.49	4.28	31561.40	8.78
26-Sep-14	42.99	53.73	54.87	57.52	4.14	31959.46	8.67
27-Sep-14	39.43	49.34	54.33	57.53	4.20	31858.58	8.63
28-Sep-14	37.45	46.38	53.61	57.53	4.00	32306.83	8.63
29-Sep-14	39.50	49.07	52.98	57.50	4.05	33148.90	8.65
30-Sep-14	43.61	55.01	53.02	57.45	4.31	32662.42	8.66
1-Oct-14	53.01	67.49	53.50	57.44	4.46	36778.98	8.84
2-Oct-14	58.26	76.39	55.63	57.49	4.95	34677.38	8.99
3-Oct-14	55.59	71.88	58.10	57.56	4.66	35297.57	9.21
4-Oct-14	43.49	53.57	59.39	57.60	3.90	34499.27	9.43
5-Oct-14	39.99	48.39	59.89	57.61	3.58	33654.06	9.64
6-Oct-14	42.88	53.96	60.52	57.61	4.26	33498.41	9.83
7-Oct-14	43.72	54.72	60.99	57.61	4.18	33004.30	10.03
8-Oct-14	43.32	54.26	60.16	57.60	4.20	32234.19	10.01
9-Oct-14	42.14	52.43	57.25	57.60	4.09	32698.98	9.97
10-Oct-14	42.58	53.61	53.99	57.63	4.28	32921.83	9.77
11-Oct-14	41.27	52.26	53.08	57.63	4.39	32407.40	9.54
12-Oct-14	42.38	53.69	53.29	57.59	4.39	34126.13	9.40
13-Oct-14	41.82	53.89	53.49	57.58	4.67	33581.57	9.23
14-Oct-14	35.75	45.10	52.96	57.55	4.28	31951.91	9.00
15-Oct-14	42.56	53.94	52.21	57.52	4.39	32137.25	8.82
16-Oct-14	41.69	52.16	52.07	57.52	4.17	32773.43	8.70
17-Oct-14	43.30	53.39	52.14	57.50	3.93	32629.38	8.65
18-Oct-14	41.60	51.15	52.21	57.48	3.88	30341.15	8.55
19-Oct-14	33.90	41.09	50.99	57.45	3.64	30457.80	8.36
20-Oct-14	34.12	41.22	49.45	57.44	3.57	30313.40	8.15
21-Oct-14	32.83	39.49	47.68	57.41	3.50	29940.62	7.96
22-Oct-14	45.24	55.82	47.38	57.37	3.92	32551.17	7.86
23-Oct-14	48.18	59.88	48.39	57.39	4.06	32342.61	7.76
24-Oct-14	42.72	52.93	48.92	57.45	3.99	31897.65	7.66
25-Oct-14	44.84	55.57	48.80	57.47	3.99	32354.12	7.66
26-Oct-14	35.69	43.46	49.72	57.48	3.69	32842.20	7.71
27-Oct-14	39.44	49.73	50.18	57.47	4.30	33119.23	7.83
28-Oct-14	32.87	40.98	51.25	57.45	4.08	32380.58	7.99
29-Oct-14	33.05	41.65	50.45	57.44	4.28	32679.14	8.07
30-Oct-14	35.36	44.43	48.07	57.39	4.23	31437.10	8.03
31-Oct-14	31.71	39.99	45.95	57.31	4.29	31605.19	7.95
1-Nov-14	38.42	48.10	44.42	57.25	4.18	32439.07	7.86
2-Nov-14	37.69	47.55	44.44	57.24	4.32	33856.59	7.76
3-Nov-14	37.94	50.19	44.44	57.23	5.06	33780.56	7.65
4-Nov-14	36.39	48.10	45.20	57.21	5.04	33100.86	7.53
5-Nov-14	35.73	47.11	46.11	57.16	5.04	32712.70	7.43

	NOx ppm	NOx ppm Corrected	Nox ppm Corrected.7d avg	Nox ppm Corrected.365davg	O2	Flowrate dscfm	7 day rolling
6-Nov-14	34.99	45.12	46.43	57.10	4.65	31550.04	7.40
7-Nov-14	40.21	51.09	47.47	57.09	4.41	33330.18	7.49
8-Nov-14	39.81	50.23	48.53	57.05	4.31	30789.88	7.53
9-Nov-14	40.58	51.19	48.53	57.01	4.30	32683.06	7.59
10-Nov-14	45.99	58.18	49.57	57.01	4.28	34446.45	7.74
11-Nov-14	51.54	66.48	51.40	57.06	4.69	34437.06	7.93
12-Nov-14	46.02	58.16	53.75	57.11	4.31	33407.54	8.14
13-Nov-14	44.94	54.65	54.74	57.11	3.71	33142.03	8.39
14-Nov-14	48.34	58.12	55.98	57.13	3.51	33223.03	8.58
15-Nov-14	49.53	61.19	57.57	57.13	3.98	33821.66	8.91
16-Nov-14	44.83	56.17	58.58	57.07	4.19	33594.49	9.18
17-Nov-14	40.32	49.16	58.59	57.03	3.73	32556.64	9.32
18-Nov-14	43.66	54.31	56.68	57.01	4.06	32748.64	9.38
19-Nov-14	47.03	60.54	55.75	56.98	4.64	32245.76	9.39
20-Nov-14	53.66	68.53	57.61	56.96	4.51	31305.45	9.38
21-Nov-14	50.73	64.36	59.08	56.96	4.40	30381.52	9.33
22-Nov-14	38.68	48.32	58.25	56.95	4.14	33097.50	9.32
23-Nov-14	37.21	45.27	56.77	56.96	3.72	32595.85	9.23
24-Nov-14	29.51	36.35	54.81	56.93	3.93	33246.06	9.17
25-Nov-14	35.57	44.63	53.45	56.92	4.23	33269.43	9.12
26-Nov-14	38.50	48.61	51.78	56.88	4.32	32435.17	9.03
27-Nov-14	38.39	48.32	49.33	56.80	4.27	32590.44	8.89
28-Nov-14	41.14	51.69	46.72	56.76	4.23	32573.62	8.70
29-Nov-14	41.54	51.78	46.41	56.77	4.11	33553.97	8.43
30-Nov-14	47.89	60.58	47.48	56.77	4.37	32987.83	8.23
1-Dec-14	42.94	52.86	49.95	56.77	3.91	32282.28	8.08
2-Dec-14	47.77	57.41	51.90	56.77	3.50	31691.79	7.99
3-Dec-14	47.37	57.26	53.61	56.80	3.59	32579.34	8.03
4-Dec-14	42.01	51.71	54.57	56.82	3.90	32522.51	8.15
5-Dec-14	45.36	56.34	55.00	56.81	4.00	32440.14	8.34
6-Dec-14	44.99	56.70	56.01	56.82	4.27	30722.55	8.46
7-Dec-14	40.75	50.97	55.43	56.82	4.17	32092.12	8.61
8-Dec-14	42.47	53.17	54.75	56.83	4.16	31164.63	8.68
9-Dec-14	43.73	54.83	54.70	56.84	4.22	31192.73	8.72
10-Dec-14	45.20	56.75	54.33	56.84	4.23	32172.03	8.72
11-Dec-14	44.61	55.83	54.65	56.83	4.16	32171.50	8.71
12-Dec-14	42.47	52.83	54.94	56.85	4.08	32452.32	8.71
13-Dec-14	38.25	47.17	53.56	56.86	3.93	33684.17	8.77
14-Dec-14	34.93	43.10	52.69	56.83	3.92	33995.12	8.78
15-Dec-14	34.41	42.94	51.01	56.78	4.10	32552.18	8.74
16-Dec-14	53.84	69.56	52.01	56.78	4.61	31453.47	8.69
17-Dec-14	42.01	52.65	52.27	56.80	4.18	33309.95	8.69
18-Dec-14	41.92	52.41	51.71	56.82	4.17	34077.20	8.69
19-Dec-14	38.82	48.95	51.09	56.83	4.32	33256.56	8.63
20-Dec-14	47.42	60.24	51.41	56.85	4.41	32499.56	8.54
21-Dec-14	53.88	68.03	54.54	56.91	4.32	33209.52	8.55
22-Dec-14	50.53	62.42	58.07	56.95	3.96	33452.47	8.75
23-Dec-14	36.19	44.41	57.09	56.95	3.82	34722.84	9.00
24-Dec-14	38.92	48.35	55.33	56.94	4.05	34207.54	9.11
25-Dec-14	37.67	46.46	54.47	56.94	3.94	35341.46	9.22
26-Dec-14	37.28	46.93	53.94	56.86	4.24	34789.52	9.35
27-Dec-14	36.60	46.52	53.38	56.73	4.40	33859.45	9.45
28-Dec-14	33.23	41.82	49.93	56.66	4.27	33955.60	9.37
29-Dec-14	35.50	44.60	46.77	56.59	4.22	35113.24	9.15
30-Dec-14	37.87	48.42	45.57	56.58	4.49	34222.07	8.85
31-Dec-14	40.40	52.35	46.38	56.57	4.75	35193.94	8.66
Mean	45.72	56.54	56.68	58.59	3.95	28782.41	8.08
Max	64.78	83.41	69.72	63.59	7.04	71380.95	12.18
Min	29.51	36.35	44.42	56.57	2.60	21924.19	5.96
Std deviation	6.12	7.67	5.09	1.86	0.62	5219.46	1.06
	NOx ppm	NOx ppmCorre	Nox ppmCorrecte	Nox ppmCorrecte	O2	dscfm	7 day rolling

GOLDEN SPECIALTY

THE GOLD STANDARD FOR AIR TESTING

Air Quality Test Report

Particulate Emissions Testing

Western Refining Southwest
Gallup Refinery
Jamestown, New Mexico

Fluid Catalytic Cracking Unit (FCCU) Electrostatic Precipitator (ESP) Stack

Title V Permit No.: P021-R2; NSR Permit No.: 0633-M12-R1

Report Number: 160035-A
Dates Tested: February 9, 2016
Date Prepared: March 10, 2016

PREPARED FOR
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Air Quality Test Report

Particulate Emissions Testing

Western Refining Southwest

Gallup Refinery
Jamestown, New Mexico

Fluid Catalytic Cracking Unit (FCCU) Electrostatic Precipitator (ESP) Stack

This report is supported by GOLDEN's Quality Assurance Manual. The information included in the report is authentic and accurate, and GOLDEN operated in conformance with ASTM D7036 to the best of our knowledge during this test program.

Certified by:

Troy M. Burrows, QSTO 2008-113
Chief Operating Officer

Larry E. Cottone, QSTI 2007-074
Regional Division Manager / Onsite QSTI

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GOLDEN SPECIALTY

Air Quality Test Report

EXECUTIVE SUMMARY

Golden Specialty, Inc.'s (GOLDEN) Southwest Regional Office was contracted by Western Refining Southwest (WNR) to perform emissions testing at their Gallup Refinery located in Jamestown, New Mexico. Testing was conducted on February 9, 2016. Testing was performed on the exhaust of the Fluid Catalytic Cracking Unit (FCCU) Electrostatic Precipitator (ESP) Stack. The test was conducted in accordance with all appropriate United States Environmental Protection Agency (USEPA) Methodologies; as well as all applicable New Mexico Environment Department (NMED) Air Quality Bureau requirements outlined in the facility's Title V Permit No. P021-R2 and New Source Review (NSR) Permit No. 0633-M12-R1.

Testing on the source was performed for the determination of concentrations and mass emission rates of nonsulfate filterable and condensable particulate matter (FPM/CPM). Testing consisted of three (3) 72-minute runs performed in accordance with USEPA Methods 1, 2, 3, 4, 5F, and 202. Testing and analysis procedures used for this project are presented in the United States Environmental Protection Agency (USEPA) document Title 40, Code of Federal Regulations, Part 60 (40 CFR 60), Appendix A, the Quality Assurance Handbook for Air Pollution Measurement Systems, Volume III, Stationary Source Specific Methods, and on the USEPA Technology Transfer Network Emission Measurement Center (EPA-TTN-EMC) website, Test Methods Section (http://www.epa.gov/ttn/emc/).

During this test program, 4 of the 5 electrical fields were operating on the source. Table 1 is the summary of the results for this test program.

Test Date(s)	**Nonsulfate Filterable Particulate Matter, lb/1,000 lb coke burn off (3-Run Average)**
Compliance Limit	*1.0*
2/9/2016	0.44

Table 1. Summary of FCCU/ESP Testing Results

INTRODUCTION

Purpose of Test

The objective of the test program was to evaluate the compliance status of the FCCU ESP relative to the requirements of permit citation A113 A.(1) and Table 106.A. Mr. Larry Cottone managed the project and was assisted by Messrs. Rohit Surathu and Gukbo Kim. Mr. Ed Riege with WNR was the refinery representative for this test program. No agency personnel were onsite during testing.

All testing includes the use of Methods 1, 2, and 4 for airflow and moisture content, respectively. Testing for O_2 and CO_2 was performed using USEPA Method 3A. The moisture content of the stack gas was measured using Method 4, which was performed inclusively with Method 5F/202. FPM and CPM samples were transported to the GOLDEN Specialty's Laboratory located in Deer Park, TX, and analyzed per the method requirements. Detailed procedures for sampling, analyses, and calculating concentrations and emission rates per the applicable methods are presented in the Performance Test Procedures and Example Calculations section of this report. The measured concentrations of FPM were then calculated and reported in emission rate units of pounds per hour (lb/hr) utilizing the measured flow rates. Emission rates in pounds per 1,000 pound coke burn off (lb/1,000 lb) were also calculated utilizing the coke burn rate provided by WNR.

All calculated reference method data is provided in Appendix E of this report. Appendix F contains process data provided by WNR. Laboratory data are provided in Appendix G of the report. Measurement uncertainty associated with this testing is addressed by following the approved test methods and test plans. Additional information regarding the measurement uncertainty can be provided upon request. The test procedures referenced in this report are in accordance with the Test Plan for this project. Deviations from the Test Plan or published Reference Methods are documented in the Problems, Deviations and/or Exceptions section of this report.

Problems, Deviations and/or Exceptions

Analytical deviations are described in the Laboratory Narrative section of the Laboratory Analysis Report in Appendix G.

GOLDEN SPECIALTY

Air Quality Test Report

TEST RESULTS

Detailed results for the testing performed on the FCCU ESP are listed below in Table 2. Test results show the emission rates to be below the limit of 1.0 lb/1,000 lb coke burn during normal operations. All supporting calibration, field, process and laboratory data collected for this project are provided in the Appendices of this report.

GOLDEN SPECIALTY

Air Quality Test Report

Plant	Western Refining - Gallup Refinery	Address	Jamestown, NM	Job #	160035-A
Location	FCCU ESP Stack	Personnel	LC/RS/GK	Date	2/9/2016

	Run Number	1	2	3	Average
Date	Test Date	2/9/2016	2/9/2016	2/9/2016	
Start	Run Start Time	13:24	15:25	17:43	
	Run Finish Time	14:43	16:43	19:00	
	Net Traversing Points	12	12	12	
Θ	Net Run Time, min.	72	72	72	72.0
D_N	Nozzle Diameter, in.	0.254	0.254	0.254	0.254
C_p	Pitot Tube Coeficient	0.84	0.84	0.84	0.84
Y	Dry Gas Meter Calibration Factor	0.977	0.977	0.977	0.977
P_{Br}	Barometric Pressure, in. Hg	23.66	23.66	23.66	23.66
ΔH	Average orifice meter Differential, in. H_2O	1.23	1.29	1.27	1.26
V_m	Dry Gas Meter Volume Sampled, ft^3	52.709	53.670	51.192	52.524
t_m	Average Dry Gas Meter Temperature, °F	89.5	81.4	57.4	76.1
V_{mstd}	Dry Gas Meter Volume Sampled, dscf	39.275	40.599	40.522	40.132
V_{mstd}	Dry Gas Meter Volume Sampled, dscm	1.112	1.150	1.148	1.137
V_{lc}	Total Moisture Liquid collected, g	141.6	135.1	127.8	134.8
V_{wstd}	Volume of Water Vapor, scf	6.68	6.37	6.03	6.36
% H_2O	Moisture Content of Stack Gas, %	14.53	13.56	12.95	13.68
$\%CO_2$	Carbon Dioxide, % vd	14.02	14.50	14.23	14.25
$\%O_2$	Oxygen, % vd	3.42	3.11	3.51	3.35
M_d	Dry Molecular Weight, lb/lb-Mole	30.38	30.45	30.42	30.41
M_s	Wet Molecular weight, lb/lb-Mole	28.58	28.76	28.81	28.72
P_g	Flue Gas Static Pressure, in. H_2O	-0.12	-0.12	-0.12	-0.12
P_s	Absolute Flue Gas Pressure, in. Hg	23.65	23.65	23.65	23.65
t_s	Average Stack Gas Temperature, °F	613.6	610.9	605.7	610.1
$\sqrt{\Delta P_{avg}}$	Average Square-Root Velocity Head, in H_2O	0.854	0.868	0.871	0.864
V_s	Average Stack Gas Velocity, ft/sec	77.29	78.20	78.24	77.91
A_s	Stack Crossectional Area, ft^2	19.63	19.63	19.63	19.63
Q_{std}	Dry Volumetric Flow Rate, dry scfm	30,254	31,036	31,429	30,906
Q_{aw}	Actual Wet Volumetric Flue Gas Flow Rate, acfm	91,050	92,128	92,178	91,785
%I	Percent Isokinetic of Sampling Rate, %	100.6	101.4	99.9	100.6
CB	Coke Burn Rate, 1,000 lb/hr	6.15	6.25	6.21	6.20
W_f	Nonsulfate Filterable Particulate Matter, g	0.0251	0.0244	0.0312	0.0269
C_f	Nonsulfate Filterable Particulate Concentration, gr/dscf	0.0099	0.0093	0.0119	0.0103
E_f	Nonsulfate Filterable Particulate Emission Rate, lb/MMBtu	0.018	0.017	0.022	0.019
E_f	Nonsulfate Filterable Particulate Emission Rate, lb/hr	2.56	2.47	3.20	2.74
E_f	Nonsulfate Filterable Particulate Emission Rate, tons/yr	11.20	10.81	14.02	12.01
E_f	Nonsulfate Filterable Particulate Emission Rate, lb/1,000 lb coke burn off	0.42	0.39	0.52	0.44
W_c	Condensable Particulate Matter, g	0.0022	0.0011	0.0007	0.0013
C_c	Condensable Particulate Concentration, gr/dscf	0.0009	0.0004	0.0003	0.0005
E_c	Condensable Particulate Emission Rate, lb/MMBtu	0.0016	0.0008	0.0005	0.0010
E_c	Condensable Particulate Emission Rate, lb/hr	0.22	0.11	0.07	0.14
W_t	Total Particulate Matter, g	0.027	0.026	0.032	0.028
C_t	Total Particulate Concentration, gr/dscf	0.011	0.010	0.012	0.011
E_t	Total Particulate Emission Rate, lb/MMBtu	0.020	0.018	0.022	0.020
E_t	Total Particulate Emission Rate, lb/hr	2.78	2.58	3.27	2.88
E_t	Total Particulate Emission Rate, tons/yr	12.18	11.29	14.33	12.60
E_t	Total Particulate Emission Rate, lb/1,000 lb coke burn off	0.45	0.41	0.53	0.46

Tons per year based on 8,760 hours per year.

Table 2. FCCU/ESP Testing Results - February 9, 2016

GOLDEN SPECIALTY

THE GOLD STANDARD FOR AIR TESTING

Air Quality Test Report

Particulate Emissions Testing

Western Refining Southwest

Gallup Refinery
Jamestown, New Mexico

Fluid Catalytic Cracking Unit (FCCU) Electrostatic Precipitator (ESP) Stack

Title V Permit No.: P021-R2-M1; NSR Permit No.: 0633-M12-R2

Report Number: 170009-A
Dates Tested: January 18, 2017
Date Prepared: February 17, 2017

PREPARED FOR
Mr. Ed Riege,
Manager of Remediation and Special Environmental Projects
Western Refining Southwest
Gallup Refinery
I-40 @ Exit 39
Jamestown, NM 87347

Phone 505.722.0217

Prepared by:
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Air Quality Test Report

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Western Refining Southwest
Gallup Refinery
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This report is supported by GOLDEN's Quality Assurance Manual. The information included in the report is authentic and accurate, and GOLDEN operated in conformance with ASTM D7036 to the best of our knowledge during this test program.

Certified by:

Scott B. Swiggard, Ph.D., QSTI 2006-025
Technical Director

Shamit Nakra, Ph.D., QI (Groups I-IV)
Project Manager / Onsite QI

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EXECUTIVE SUMMARY

Golden Specialty, Inc.'s (GOLDEN) Southwest Regional Office was contracted by Western Refining Southwest (WNR) to perform emissions testing at their Gallup Refinery located in Jamestown, New Mexico. Testing was conducted on January 18, 2017. Testing was performed on the exhaust of the Fluid Catalytic Cracking Unit (FCCU) Electrostatic Precipitator (ESP) Stack. The test was conducted in accordance with all appropriate United States Environmental Protection Agency (USEPA) Methodologies; as well as all applicable New Mexico Environment Department (NMED) Air Quality Bureau requirements outlined in the facility's Title V Permit No. P021-R2-M1 and New Source Review (NSR) Permit No. 0633-M12-R2.

Testing on the source was performed for the determination of concentrations and mass emission rates of non-sulfate filterable and condensable particulate matter (FPM/CPM). Testing consisted of three (3) 72-minute runs performed in accordance with USEPA Methods 1, 2, 3, 4, 5F, and 202. Testing and analysis procedures used for this project are presented in the United States Environmental Protection Agency (USEPA) document Title 40, Code of Federal Regulations, Part 60 (40 CFR 60), Appendix A, the Quality Assurance Handbook for Air Pollution Measurement Systems, Volume III, Stationary Source Specific Methods, and on the USEPA Technology Transfer Network Emission Measurement Center (EPA-TTN-EMC) website, Test Methods Section (http://www.epa.gov/ttn/emc/).

During this test program, 5 of the 5 electrical fields were operating on the source. Table 1 is the summary of the results for this test program.

Test Date(s)	Nonsulfate Filterable Particulate Matter, lb/1,000 lb coke burn off (3-Run Average)
Compliance Limit	*1.0*
1/18/2017	0.44

Table 1. Summary of FCCU/ESP Testing Results

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INTRODUCTION

Purpose of Test

The objective of the test program was to evaluate the compliance status of the FCCU ESP relative to the requirements of permit citation A113 A.(1) and Table 106.A. Mr. Shamit Nakra was the onsite project manager, and was assisted by Mr. Austin Keough and Mr. Jonathon Fuller. Mr. Ed Riege with WNR was the refinery representative for this test program. No agency personnel were onsite during testing.

All testing includes the use of Methods 1, 2, and 4 for airflow and moisture content, respectively. Testing for O_2 and CO_2 was performed using USEPA Method 3A. The moisture content of the stack gas was measured using Method 4, which was performed inclusively with Method 5F/202. FPM and CPM samples were transported to the GOLDEN Specialty's Laboratory located in Deer Park, TX, and analyzed per the method requirements. Detailed procedures for sampling, analyses, and calculating concentrations and emission rates per the applicable methods are presented in the Performance Test Procedures and Example Calculations section of this report. The measured concentrations of FPM were then calculated and reported in emission rate units of pounds per hour (lb/hr) utilizing the measured flow rates. Emission rates in pounds per 1,000 pound coke burn off (lb/1,000 lb) were also calculated utilizing the coke burn rate provided by WNR.

All calculated reference method data is provided in Appendix E of this report. Appendix F contains process data provided by WNR. Laboratory data are provided in Appendix G of the report. Measurement uncertainty associated with this testing is addressed by following the approved test methods and test plans. Additional information regarding the measurement uncertainty can be provided upon request. The test procedures referenced in this report are in accordance with the Test Plan for this project. Deviations from the Test Plan or published Reference Methods are documented in the Problems, Deviations and/or Exceptions section of this report.

Problems, Deviations and/or Exceptions

Analytical deviations are described in the Laboratory Narrative section of the Laboratory Analysis Report in Appendix G.

TEST RESULTS

Detailed results for the testing performed on the FCCU ESP are listed below in Table 2. Test results show the emission rates to be below the limit of 1.0 lb/1,000 lb coke burn during normal operations. All supporting calibration, field, process and laboratory data collected for this project are provided in the Appendices of this report.

GOLDEN SPECIALTY

Air Quality Test Report

Plant	Western Refining - Gallup Refinery	Address	Jamestown, NM	Job #	170009-A
Location	FCCU ESP Stack	Personnel	SN/AK/JF	Date	1/18/2017

	Run Number	1	2	3	Average
Date	Test Date	1/18/2017	1/18/2017	1/18/2017	
Start	Run Start Time	10:13	12:30	15:20	
	Run Finish Time	11:31	13:52	16:38	
	Net Traversing Points	12	12	12	
Θ	Net Run Time, min.	72	72	72	72.0
D_N	Nozzle Diameter, in.	0.240	0.240	0.240	0.240
C_p	Pitot Tube Coeficient	0.84	0.84	0.84	0.84
Y	Dry Gas Meter Calibration Factor	0.996	0.996	0.996	0.996
P_{Br}	Barometric Pressure, in. Hg	23.41	23.41	23.41	23.41
ΔH	Average orifice meter Differential, in. H_2O	1.15	0.58	0.69	0.81
V_m	Dry Gas Meter Volume Sampled, ft^3	48.774	35.570	38.199	40.848
t_m	Average Dry Gas Meter Temperature, F	47.5	52.6	52.7	50.9
V_{mstd}	Dry Gas Meter Volume Sampled, dscf	39.687	28.605	30.722	33.005
V_{mstd}	Dry Gas Meter Volume Sampled, dscm	1.124	0.810	0.870	0.935
V_{lc}	Total Moisture Liquid collected, g	121.0	85.5	98.0	101.5
V_{wstd}	Volume of Water Vapor, scf	5.71	4.03	4.62	4.79
% H_2O	Moisture Content of Stack Gas, %	12.57	12.35	13.07	12.66
%CO_2	Carbon Dioxide, % vd	13.74	13.74	13.74	13.74
%O_2	Oxygen, % vd	2.94	2.94	2.94	2.94
M_d	Dry Molecular Weight, lb/lb-Mole	30.32	30.32	30.32	30.32
M_s	Wet Molecular weight, lb/lb-Mole	28.77	28.79	28.71	28.76
P_g	Flue Gas Static Pressure, in. H_2O	0.92	0.92	0.92	0.92
P_s	Absolute Flue Gas Pressure, in. Hg	23.48	23.48	23.48	23.48
t_s	Average Stack Gas Temperature, °F	680.8	674.8	674.7	676.8
$\sqrt{\Delta P_{avg}}$	Average Square-Root Velocity Head, in H_2O	0.997	0.700	0.756	0.817
V_s	Average Stack Gas Velocity, ft/sec	93.02	65.10	70.41	76.18
A_s	Stack Crossectional Area, ft^2	19.63	19.63	19.63	19.63
Q_{std}	Dry Volumetric Flow Rate, dry scfm	34,795	24,541	26,330	28,555
Q_{aw}	Actual Wet Volumetric Flue Gas Flow Rate, acfm	109,585	76,692	82,953	89,743
%I	Percent Isokinetic of Sampling Rate, %	99.0	101.2	101.3	100.5
FR	Feed Rate	9,167.6	9,150.9	9,209.9	9,176.1
CB	Coke Burn Rate, 1,000 lb/hr	7.36	7.37	7.43	7.38
W_f	Nonsulfate Filterable Particulate Matter, g	0.0113	0.0145	0.0610	0.0289
C_f	Nonsulfate Filterable Particulate Concentration, gr/dscf	0.0044	0.0078	0.0306	0.0143
E_f	Nonsulfate Filterable Particulate Emission Rate, lb/MMBtu	0.008	0.015	0.059	0.027
E_f	Nonsulfate Filterable Particulate Emission Rate, lb/hr	1.31	1.65	6.91	3.29
E_f	Nonsulfate Filterable Particulate Emission Rate, tons/yr	5.74	7.21	30.28	14.41
E_f	Nonsulfate Filterable Particulate Emission Rate, lb/1,000 lb coke burn off	0.18	0.22	0.93	0.44
W_c	Condensable Particulate Matter, g	0.0005	0.0007	0.0010	0.0007
C_c	Condensable Particulate Concentration, gr/dscf	0.0002	0.0004	0.0005	0.0004
E_c	Condensable Particulate Emission Rate, lb/MMBtu	0.0004	0.0007	0.0010	0.0007
E_c	Condensable Particulate Emission Rate, lb/hr	0.058	0.079	0.113	0.084
W_t	Total Particulate Matter, g	0.012	0.015	0.062	0.030
C_t	Total Particulate Concentration, gr/dscf	0.005	0.008	0.031	0.015
E_t	Total Particulate Emission Rate, lb/MMBtu	0.009	0.016	0.060	0.028
E_t	Total Particulate Emission Rate, lb/hr	1.37	1.72	7.03	3.37
E_t	Total Particulate Emission Rate, tons/yr	5.99	7.55	30.78	14.78
E_t	Total Particulate Emission Rate, lb/1,000 lb coke burn off	0.19	0.23	0.95	0.46

Tons per year based on 8,760 hours per year.

Table 2. FCCU/ESP Testing Results - January 18, 2017

New Mexico Environment Department
Air Quality Bureau
1301 Siler Road Building B
Santa Fe, NM 87507
Phone (505) 476-4300 Fax (505) 476-4375

Version 1/1/2010

NMED USE ONLY	
DTS	
TEMPO	

UNIVERSAL STACK TEST NOTIFICATION, PROTOCOL AND REPORT FORM

NMED USE ONLY	
Staff	
Admin	

Submit to: Stacktest.aqb@state.nm.us

I. DATABASE HEADER INFORMATION (drop down menus in bold)		
a. AI# **0888**	**Test Report**	**Periodic Test (EPA Method)**

d. Company Name: **Western Refining Southwest**	e. Facility Name: **Gallup Refinery**
f. Emission Unit Numbers: **Refinery combustion sources**	g. Emission Unit Description (boiler, Waukesha 7042, etc) **FCCU/ESP**

h. Reports - Tracking Number from notification response: **CMT**	i. Proposed Test Date: **Week of 2/28/17**	j. Actual test date: **2/28/2017**

k. Reason for test (name permit requirement, NSPS, MACT, consent decree, etc. Indicate here is this notification is a revised test date only)

This performance test will be done with four out of five electrical fields operating to determine compliance with the NSPS Subpart J particulate matter emission limit at condition A106.L.

Testing will be conducted in reference to permit citation A113 A.(1) to verify compliance with the current particulate matter emissions limits listed for the ESP stack in permit Table 106.A.

II. GENERAL COMPANY AND FACILITY INFORMATION

a.Company Address: **92 Giant Crossing Road**			k.. Facility Address: **I-40 Exit 39**		
b. City: **Gallup**	c. State: **NM**	d. Zip: **87301**	l. City: **Jamestown**	m. State: **NM**	n. Zip: **87347**
e. Environmental Contact: **Loretta Morgan**	f. Title: **Environmental Specialist**		o. Facility Contact: **Loretta Morgan**	p. Title: **Environmental Specialist**	
g. Phone Number: **505-722-0242**	h. Cell Number:		q. Phone Number: **505-722-0242**	r. Cell Number:	
i. Email Address: **loretta.morgan@wnr.com**			s. Email Address: **loretta.morgan@wnr.com**		
j. Title V Permit Number: **P021-R2-M1**			t. NSR Permit Number: **0633-M12-R2**		

u. Detailed driving directions from nearest New Mexico town:
The refinery is located at Exit 39 Of Interstate Route 40 which is 17 miles east of Gallup.

UNIVERSAL STACK TEST NOTIFICATION, PROTOCOL AND REPORT FORM

III. TESTING FIRM

a. Company: Golden Specialty, Inc.	g. Contact: Shamit Nakra
b. Address 1: 3855 South 500 West Suite A	h. Title: Project Manager
c. Address 2:	i. Office Phone: 801-269-0550 / j. Cell Phone: 385-252-7553
d. City: Salt Lake City / e. State: UT / f. Zip: 84115	k. Email Address: snakra@goldenspecialty.com

IV. EMISSION UNIT

a. Emission Unit Number: FCCU	b. Make & Model Number
c. Serial Number:	d. Permitted Capacity: 8500 barrels/day

e Exceptions: Explain if test is late, rescheduled, related to an enforcement action:

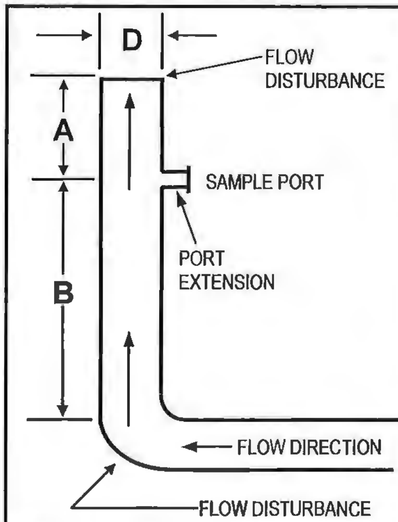
g. Emission Unit Description and brief process name or description:
Fluid Catalytic Cracking Unit exhausts to the CO Boiler which through the ESP which exhausts through the ESP stack

h. Installation Date:	i. Startup Date:	k. Date Reached Max. Capacity:
ESP-10/2012	2012	2012

l. Control Equipment Description as listed in permit (model, ser. # etc. if applicable):
ESP Hamon Research-Cottrell custom built for PM control

STACK PARAMETERS

m. Velocity (ft/sec):	80
n. Temperature (°C):	300
o. Stack Diameter, D (in.):	60
p. Distance to Stack Bends or Obstructions:	
Upstream, Distance A (in.):	846
Downstream, Distance B (in.):	492



EXAMPLE VIEW SHOWING DISTANCES FROM SAMPLE PORT TO FLOW DISTURBANCES

Attach an explanation or drawing to explain any difficult or unusual stack geometry or parameters.

V. POLLUTANTS AND PROPOSED TEST METHODS

Pollutant or Parameter:		Proposed Test Methods (Deviations from approved methods require supporting documentation and prior authorization)	Deviation to Test Method Requested
☐	Portable Analyzer Methods for NOx, CO, SO_2		☐
☐	NOx	EPA Method 7E	☐
☐	CO	EPA Method 10	☐
☐	SO2	EPA Method 6	☐
☐	VOCs	(Specify)	☐
☐	HAPs	(Specify)	☐
☐	PM (TSP)	EPA Method 5	☐
☐	PM10	EPA Method 201	☐
☐	PM2.5	(Specify)	☐
☐	Opacity	EPA Method 9	☐

☐	Visual E.	EPA Method 22	☐
☒	Stack Flow	EPA Methods 1 - 3	☐
☒	Moisture	EPA Method 4	☐
☒	Other	(Specify) 5F Nonsulfate Acid Particulate Matter	☐
☒	Other	(Specify) EPA Method 202 for CPM Measurement	☐
List Specific VOC's and HAP's:			

VI. PROPOSED TEST RUN AND TEST LOAD INFORMATION

a. Number of Test Runs:	b. Run Duration	c. Required by (regulation or permit number):	d. Specific Condition or Section:
3	min of 60 mins	NSR 0633-M12-R2	A113 A.(1)

PLEASE NOTE – Default run duration is 60 minutes, unless otherwise specified by an applicable regulation.

e. Expected Load:	f. Percent of Permitted Capacity:	g. Is this an opacity test?	h. If yes, no. of observation pts.:
>7650 bpd	>90%	Yes ☐ No ☒	

i. If expected load during test is less than 90% of capacity, explain:

NOTE – Failure to test at 90-100% of permitted load will limit unit operation to 110% of tested load until a new initial compliance test is conducted.

PLANT OR UNIT OPERATING PARAMETERS TO BE MONITORED

j. List and explain the plant operating parameters that will be monitored and applicable permit conditions or regulatory standards.

Plant will monitor the refinery crude feed rate and coke burn off rate during the tests.

VII. ADDITIONAL DETAILS (where applicable)

RATA and INSTRUMENTAL ANALYZER CALIBRATION PROCEDURES

a. Do any of the methods you are proposing utilize instrumental analyzers (i.e.; EPA Methods 3A, 6C, 7E, 10, 18, 25/25A, 320 etc.)? If yes, briefly describe analyzer calibration procedures and/or calibration standard procedures. Enter the highest pollutant concentration expected and the proposed concentrations of calibration gases.	☒ Yes	☐ No

Instruments will be calibrated using Protocol 1 calibration gases meeting the concentration specifications of Reference Method 3A. System bias and drift checks will be performed according to Reference Methods 3A before and after each test run.

SAMPLING TRAIN LEAK CHECK PROCEDURES

b. Do any of the methods you are proposing utilize the EPA Method 5 sampling train (i.e.; EPA Methods 1-4, 5, 17, 26/26A, 29, etc.)? If yes, briefly describe sampling train and pitot tube leak check procedures:	☒ Yes	☐ No

Reference Method 5F sampling equipment will be leak checked according to 40 CFR Part 60 Appendix A, Reference Method 2 and 40 CFR 60 Appendix A Reference Method 5, Section 8.1.3, respectively.

EPA METHOD 19 IN LIEU OF EPA METHODS 1-4

c. Are you proposing to utilize EPA Method 19 in lieu of EPA Methods 1-4? If yes, explain why you believe this proposal is justified:	☐ Yes	☒ No

PLEASE NOTE – EPA Method 19 may be utilized in lieu of EPA Methods 1-4, subject to the approval of the Department. If you are proposing to utilize EPA Method 19 in lieu of EPA Methods 1-4, you MUST include a recent fuel gas heating value analysis as well as a recent fuel flow meter calibration certificate, preferably conducted on the day of the test, but no earlier than three months prior to the test date. If the analyses have been conducted prior to the test date, you MUST append the certificates to the protocol. If conducted on the day of the test, you MUST append the certificates to the final test report.

VIII. ATTACHMENTS (as needed to support proposed test; check all that apply)	
NOTIFICATION/PROTOCOL ATTACHMENTS	
☐	Road Map Indicating Directions from Nearest New Mexico Town to Facility
☐	Schematic of process being tested showing emission points, sampling sites and stack cross-section
☐	Copy of proposed test methods (except for those promulgated test methods found in 40 CFR 51, 60, 61 and 63)
☐	Fuel Heating Value Analysis
☐	Fuel Flow Meter Calibration Certificate
☐	Other:
☐	Other:
TEST REPORT ATTACHMENTS	
☒	**Section 2. Tables of Results**
☐	**Supporting Documents (Specify)**
Retain Report Section 3 - Test Procedures, Data, Calculations, Appendices – 2 years NSR permits, 5 years TV	

IX. CERTIFICATION		
This document has been prepared under my supervision and is accurate and complete to the best of my knowledge. I understand that acceptance of this protocol does not waive the requirements of any permit or regulation. I understand that any procedural errors or omissions are the sole responsibility of the permit holder.		
Signature:	Print Name and Title: **Loretta Morgan, Environmental Specialist**	Date: 3/30/17
Responsible Official for Title V? ☐ Yes	☒ No (R.O signature not required for routine periodic testing)	

Plant	Western Refining - Gallup Refinery	Address	Jamestown, NM	Job #	170086
Location	FCCU ESP Stack	Personnel	SN/RS/AT	Date	2/28/2017

	Run Number	1	2	3	*Average
Date	Test Date	2/28/2017	2/28/2017	2/28/2017	
Start	Run Start Time	13:26	15:15	18:06	
	Run Finish Time	14:45	18:00	19:23	
	Net Traversing Points	12	12	12	
Θ	Net Run Time, min.	72	72	72	72
D_N	Nozzle Diameter, in.	0.239	0.239	0.239	0.239
C_p	Pitot Tube Coefficient	0.84	0.84	0.84	0.84
Y	Dry Gas Meter Calibration Factor	0.996	0.996	0.977	0.987
P_{Br}	Barometric Pressure, in. Hg	23.20	23.20	23.20	23.20
ΔH	Average orifice meter Differential, in. H_2O	0.97	0.99	1.00	0.99
V_m	Dry Gas Meter Volume Sampled, ft^3	46.985	47.069	48.535	47.802
t_m	Average Dry Gas Meter Temperature, °F	80.0	75.6	82.4	79.0
V_{mstd}	Dry Gas Meter Volume Sampled, dscf	35.582	35.938	35.897	35.918
V_{mstd}	Dry Gas Meter Volume Sampled, dscm	1.008	1.018	1.017	1.017
V_{lc}	Total Moisture Liquid collected, g	125.7	112.6	107.5	110.1
V_{wstd}	Volume of Water Vapor, scf	5.93	5.31	5.07	5.19
% H_2O	Moisture Content of Stack Gas, %	14.28	12.87	12.37	12.62
$\%CO_2$	Carbon Dioxide, % vd	13.21	13.21	13.21	13.21
$\%O_2$	Oxygen, % vd	3.92	3.92	3.92	3.92
M_d	Dry Molecular Weight, lb/lb-Mole	30.27	30.27	30.27	30.27
M_s	Wet Molecular weight, lb/lb-Mole	28.52	28.69	28.75	28.72
P_g	Flue Gas Static Pressure, in. H_2O	0.90	0.90	0.90	0.90
P_s	Absolute Flue Gas Pressure, in. Hg	23.26	23.26	23.26	23.26
t_s	Average Stack Gas Temperature, °F	652.8	655.0	658.2	656.6
$\sqrt{\Delta P}_{avg}$	Average Square-Root Velocity Head, in H_2O	0.901	0.902	0.899	0.901
V_s	Average Stack Gas Velocity, ft/sec	83.76	83.72	83.49	83.60
A_s	Stack Crossectional Area, ft^2	19.63	19.63	19.63	19.63
Q_{std}	Dry Volumetric Flow Rate, dry scfm	31,202	31,636	31,641	31,638.9
Q_{aw}	Actual Wet Volumetric Flue Gas Flow Rate, acfm	98,678	98,627	98,360	98,493.8
%I	Percent Isokinetic of Sampling Rate, %	99.8	99.4	99.3	99.4
CB	Coke Burn Rate, 1,000 lb/hr	7.66	7.64	7.61	7.62
W_f	Nonsulfate Filterable Particulate Matter, g	0.408	0.054	0.047	0.0507
C_f	Nonsulfate Filterable Particulate Concentration, gr/dscf	0.177	0.023	0.020	0.022
E_f	Nonsulfate Filterable Particulate Emission Rate, lb/MMBtu	0.352	0.046	0.040	0.043
E_f	Nonsulfate Filterable Particulate Emission Rate, lb/hr	47.37	6.31	5.50	5.91
E_f	Nonsulfate Filterable Particulate Emission Rate, tons/yr	207.46	27.64	24.10	25.87
E_f	Nonsulfate Filterable Particulate Emission Rate, lb/1,000 lb coke burn off	6.18	0.83	0.72	0.77
W_c	Condensable Particulate Matter, g	0.062	0.026	0.0075	0.017
C_c	Condensable Particulate Concentration, gr/dscf	0.027	0.011	0.0032	0.0072
E_c	Condensable Particulate Emission Rate, lb/MMBtu	0.054	0.022	0.0064	0.014
E_c	Condensable Particulate Emission Rate, lb/hr	7.20	3.00	0.87	1.94
W_t	Total Particulate Matter, g	0.471	0.080	0.055	0.067
C_t	Total Particulate Concentration, gr/dscf	0.204	0.034	0.024	0.029
E_t	Total Particulate Emission Rate, lb/MMBtu	0.406	0.068	0.047	0.058
E_t	Total Particulate Emission Rate, lb/hr	54.57	9.31	6.38	7.85
E_t	Total Particulate Emission Rate, tons/yr	239.01	40.80	27.93	34.36
E_t	Total Particulate Emission Rate, lb/1,000 lb coke burn off	7.12	1.22	0.84	1.03

**Average based on Runs 2 and 3 only (See Problems, Deviations, and/or Exceptions section)*
Tons per year based on 8,760 hours per year.

Table 2. FCCU/ESP Testing Results - February 28, 2017

Western Refining, El Paso, Texas

F-4180 Rheniformer Furnace Startup CO Readings; CEMS reading is for combined stack of F-4170 and F-4180

F-4170 Design Max 138 MMBtu/hr

F-4180 Design Max 43 MMBtu/hr

Start Time	F-4170	F-4180					
	Firing Rate (MMBtu/hr)	Firing Rate (MMBtu/hr)	Fuel Flow (MMSCFD)	O2 CEMS (%)	CO CEMS (ppm)	CO @3% O2 (ppm)	CO Hourly Average by rolling 15-min (ppm)
12-Apr-16 10:00:00	0.770697242	0.078355	0.002737	10	145.17	237.55	
12-Apr-16 10:15:00	3.063591645	0.075109	0.002649	10	145.52	238.12	
12-Apr-16 10:30:00	10.70701866	0.077639	0.002693	10	140.80	230.40	
12-Apr-16 10:45:00	10.54021047	0.828811	0.073261	10	146.86	240.31	236.59
12-Apr-16 11:00:00	10.56630688	3.308820	0.114721	10	157.40	257.56	241.60
12-Apr-16 11:15:00	10.53294856	3.325690	0.114803	10	158.90	260.01	247.07
12-Apr-16 11:30:00	10.50341047	3.321178	0.114685	10	158.15	258.78	254.17
12-Apr-16 11:45:00	10.25661084	3.274932	0.112325	10	157.34	257.47	258.46
12-Apr-16 12:00:00	14.90743564	3.227263	0.168444	10	211.99	346.90	280.79
12-Apr-16 12:15:00	22.12957004	8.341914	0.325548	10	245.50	401.72	316.22
12-Apr-16 12:30:00	12.96563524	9.820481	0.344724	10	264.29	432.48	359.64
12-Apr-16 12:45:00	14.44479602	10.383490	0.364259	10	286.21	468.34	412.36
12-Apr-16 13:00:00	19.90450776	10.650759	0.370441	10	305.27	499.54	450.52
12-Apr-16 13:15:00	23.01700757	10.660786	0.367834	10	311.70	510.06	477.60
12-Apr-16 13:30:00	24.60330938	10.825270	0.380876	10	295.00	482.72	490.16
12-Apr-16 13:45:00	25.36198807	11.142407	0.386913	10	258.47	422.95	478.82
12-Apr-16 14:00:00	26.07418429	11.271511	0.399508	10	214.27	350.63	441.59
12-Apr-16 14:15:00	30.38564339	12.423674	0.451472	10	183.69	300.59	389.22
12-Apr-16 14:30:00	31.37329553	14.000627	0.502443	10	153.28	250.82	331.25
12-Apr-16 14:45:00	31.28716946	15.012813	0.518036	10	122.21	199.99	275.51
12-Apr-16 15:00:00	33.48989131	15.357268	0.544557	10	79.91	130.76	220.54
12-Apr-16 15:15:00	34.11947365	16.866500	0.597568	10	56.11	91.81	168.35
12-Apr-16 15:30:00	35.4921524	17.787736	0.612783	9.980	26.14	42.69	116.31
12-Apr-16 15:45:00	36.5969087	17.463287	0.607410	9.802	8.74	14.05	69.83
12-Apr-16 16:00:00	39.66201185	17.474268	0.609947	9.777	24.84	39.85	47.10
12-Apr-16 16:15:00	40.48056895	19.007492	0.687178	10	23.59	38.60	33.80
12-Apr-16 16:30:00	40.89666748	19.705183	0.645275	10	19.20	31.41	30.98
12-Apr-16 16:45:00	37.24449336	17.930542	0.603295	10	32.49	53.17	40.76
12-Apr-16 17:00:00	36.85912132	17.349036	0.610244	10	26.03	42.59	41.44
12-Apr-16 17:15:00	37.22536341	19.208110	0.653805	10	25.44	41.62	42.20
12-Apr-16 17:30:00	36.83919601	18.283017	0.572849	10	23.89	39.09	44.12
12-Apr-16 17:45:00	35.71402537	13.932110	0.466414	10	30.10	49.25	43.14
12-Apr-16 18:00:00	34.88323542	13.493986	0.468806	10	28.86	47.22	44.30
12-Apr-16 18:15:00	35.15235634	13.558881	0.470428	10	19.63	32.12	41.92

Equation Set Details Report

R801_9

Print Date 6/6/2018

Equation Set	Class	Type	Chem State	Default Zero	Pegged 10k	Pegged 100k	Multiplier	Exponent	Default Factor
Refinery				0.00000400	0.073	0.110	0.00001360	0.5890	0.11400000
Refinery	AG			0.00000400	0.073	0.110	0.00001360	0.5890	0.11400000
Refinery	AG		HL	0.00000400	0.073	0.110	0.00001360	0.5890	0.02100000
Refinery	CARCN			0.00000400	0.073	0.110	0.00001360	0.8900	25.00000000
Refinery	CLVS-H			0.00000000	0.000	0.000	0.00000000	0.0000	0.00000000
Refinery	COMPR			0.00000400	0.073	0.110	0.00001360	0.5890	0.63600000
Refinery	COMPR	CVS		0.00000000	0.000	0.000	0.00000000	0.0000	0.00000000
Refinery	CONECT			0.00000750	0.028	0.030	0.00000153	0.7350	0.00025000
Refinery	CONECT	FLANGE		0.00000031	0.085	0.084	0.00000461	0.7030	0.00025000
Refinery	DRAIN			0.00000400	0.073	0.110	0.00001360	0.5890	0.00231000
Refinery	FLANGE			0.00000031	0.095	0.095	0.00000444	0.7030	0.00083000
Refinery	JCTBOX			0.00000400	0.073	0.110	0.00001360	0.5890	0.00231000
Refinery	OEL			0.00000200	0.030	0.079	0.00000220	0.7040	0.00230000
Refinery	OWWSEP			0.00000400	0.073	0.110	0.00001360	0.5890	0.00025000
Refinery	PUMP			0.00002400	0.074	0.160	0.00005030	0.6100	0.11400000
Refinery	PUMP		HL	0.00002400	0.074	0.160	0.00005030	0.6100	0.02100000
Refinery	RELIEF			0.00000400	0.073	0.110	0.00001360	0.5890	0.16000000
Refinery	RELIEF		HL	0.00000400	0.073	0.110	0.00001360	0.5890	0.01090000
Refinery	RELIEF		LL	0.00000400	0.073	0.110	0.00001360	0.5890	0.01090000
Refinery	RELIEF	PRV-CVS		0.00000000	0.000	0.000	0.00000000	0.0000	0.00000000
Refinery	RELIEF	PRV-To Process		0.00000000	0.000	0.000	0.00000000	0.0000	0.00000000
Refinery	SAMPL			0.00000400	0.073	0.110	0.00001360	0.5890	0.01500000
Refinery	TANK			0.00000400	0.073	0.110	0.00001360	0.5890	0.00025000
Refinery	VALVE			0.00000780	0.064	0.140	0.00000229	0.7460	0.02680000
Refinery	VALVE		HL	0.00000780	0.064	0.140	0.00000229	0.7460	0.00023000
Refinery	VALVE		LL	0.00000780	0.064	0.140	0.00000229	0.7460	0.01090000

United States Environmental Protection Agency
Office of Air Quality Planning and Standards
Research Triangle Park NC 27711
EPA-453/R-95-017
November 1995
Air

EPA

Protocol for Equipment Leak Emission Estimates

EPA-453/R-95-017

1995 Protocol for Equipment Leak Emission Estimates

Emission Standards Division

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Air and Radiation
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

November 1995

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Publication No. EPA-453/R-95-017

FOREWORD

The EPA's protocol for estimating equipment leak emissions is the result of detailed information gathering and data analysis. The protocol was written to provide a thorough understanding of acceptable approaches to generating process unit-specific emission estimates. In preparing this document, the EPA has encouraged knowledgeable individuals in industry and the regulatory community to provide comments.

The EPA has put forth considerable effort to make this document as comprehensive as possible. However, it should be understood that not all details and topics pertaining to equipment leaks could feasibly be included in this document. Additionally, it should be understood that the procedures presented in this document are not necessarily suitable for all applications. There will be cases where it will be necessary for the user of the document to make a professional judgement as to the appropriate technical approach for collecting and analyzing data used to estimate equipment leak emissions.

Additional data on equipment leak emissions continues to be collected. It is the intent of the EPA to periodically update this document after analysis of the data warrants such an update. For example, data recently collected in the petroleum industry has been used to revise the existing refinery correlations, which are based on data collected in the late 1970s. Furthermore, as new techniques for collecting and analyzing data are developed, they will be included in updated versions of this document.

Mention of any manufacturer or company name within this document does not represent endorsement by the EPA.

TABLE 2-2. REFINERY AVERAGE EMISSION FACTORS[a]

Equipment type	Service	Emission factor (kg/hr/source)[b]
Valves	Gas	0.0268
	Light liquid	0.0109
	Heavy liquid	0.00023
Pump seals[c]	Light liquid	0.114
	Heavy liquid	0.021
Compressor seals	Gas	0.636
Pressure relief valves	Gas	0.16
Connectors	All	0.00025
Open-ended lines	All	0.0023
Sampling connections	All	0.0150

[a]Source: Reference 2.

[b]These factors are for non-methane organic compound emission rates.

[c]The light liquid pump seal factor can be used to estimate the leak rate from agitator seals.

TABLE 2-10. PETROLEUM INDUSTRY LEAK RATE/SCREENING VALUE CORRELATIONS[a]

Equipment type/service	Correlation[b,c]
Valves/all	Leak rate (kg/hr) = 2.29E-06 × $(SV)^{0.746}$
Pump seals/all	Leak rate (kg/hr) = 5.03E-05 × $(SV)^{0.610}$
Others[d]	Leak rate (kg/hr) = 1.36E-05 × $(SV)^{0.589}$
Connectors/all	Leak rate (kg/hr) = 1.53E-06 × $(SV)^{0.735}$
Flanges/all	Leak rate (kg/hr) = 4.61E-06 × $(SV)^{0.703}$
Open-ended lines/all	Leak rate (kg/hr) = 2.20E-06 × $(SV)^{0.704}$

[a]The correlations presented in this table are revised petroleum industry correlations.

[b]SV = Screening value in ppmv.

[c]These correlations predict total organic compound emission rates (including non-VOC's such as methane and ethane).

[d]The "other" equipment type was derived from instruments, loading arms, pressure relief valves, stuffing boxes, and vents. This "other" equipment type should be applied to any equipment type other than connectors, flanges, open-ended lines, pumps, or valves.

TABLE 5-3. CONTROL EFFECTIVENESS FOR AN LDAR PROGRAM AT A REFINERY PROCESS UNIT

	Control effectiveness (%)		
Equipment type and service	Monthly monitoring 10,000 ppmv leak definition	Quarterly monitoring 10,000 ppmv leak definition	HON reg neg[a]
Valves - gas	88	70	96
Valves - light liquid	76	61	95
Pumps - light liquid	68	45	88
Connectors - all	b	b	81

[a] Control effectiveness attributable to the requirements of the proposed hazardous organic NESHAP equipment leak negotiated regulation are estimated based on equipment-specific leak definitions and performance levels.

[b] Data are not available to estimate control effectiveness.

CLIENT	WESTERN REFINING	JOB NUMBER	WR2017
UNIT DESCRIPTION	SWAATS UNIT	UNIT NUMBER	TV
PROJECT	PLANT SIMULATION	CASE	REVAMP
LOCATION	GALLUP, NEW MEXICO	REVISION	P2
BASIS	UNIT UPGRADE	DATE	9/7/17

STREAM NUMBER	100	101	102	105	109	111	112	113	NA	115	119	128	129	201	210
Vapor Stream Description	SWS Acid Gas	Amine Acid Gas	Preheated Acid Gas	Sup. Ammonia to SO2 Venturi	Ammonia Absorption Column Overhead	Acid Gas To Burner	Combustion Air Compressor Suction	Combustion Air Compressor Discharge	Natural Gas to Burner	Natural Gas (Startup)	Combustion Gas from Boiler	Vapor from Vent Scrubber	Vent to Atmosphere	Steam From Boiler	Steam to Vent
Temperature, ^{0}F	180.0	120.0	200.0	95.0	150.0	150.0	85.0	167.0	60.0	60.0	600.0	158.7	185.0	404.7	404.7
Psia	25.7	18.50	18.1	197.8	16.8	15.3	12.2	18.2	54.7	312.4	16.2	13.4	12.7	261.4	261.4
Enthalpy, Btu/Lb	-1504.816	-2303.390	-2284.512	-726.999	-2573.601	-2573.604	19.076	39.221	0.000	46.116	-984.525	-1675.546	-1915.167	-5323.190	-5323.190
Mass Flow, Lb/hr	120.3	602.2	602.2	122.5	592.1	592.1	2285.9	2285.9	0.0	89.9	2878.9	2946.8	3155.2	1375.9	207.7
Molecular Weight	22.622	37.173	37.173	17.031	35.869	35.869	28.512	28.512	16.744	16.744	30.631	26.012	25.275	18.015	18.015
Density, lb/ft3	0.085	0.111	0.095	0.566	0.092	0.084	0.060	0.077	0.164	0.938	0.044	0.053	0.046	0.567	0.567
Heat Capacity, Btu/Lb-^{0}F	0.3656	0.2324	0.2394	0.5039	0.2407	0.2407	0.2452	0.2462	0.0000	46.1159	0.2635	0.2896	0.3010	0.4656	0.4656
Viscosity, cP	0.015	0.015	0.015	0.015	0.016	0.014	0.015	0.020	0.010	0.010	0.029	0.017	0.017	0.016	0.016
Thermal Conductivity, Btu/hr-Ft-^{0}F	0.016	0.011	0.013	0.047	0.013	0.012	0.015	0.017	0.039	0.018	0.026	0.015	0.015	0.021	0.021
Volume Flow, FT3/Hr	1,420	5,446	6,334	216	6,427	7,057	38,401	29,616	0	96	65,957	56,085	67,983	2,428	367
Components, Lb-Mole/hr															
NH3	2.31	0.00	0.00	7.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
H2S	1.32	7.31	7.31	0.00	5.99	5.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.95	0.00	0.0090	0.00	0.00
SO3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00
COS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CS2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
S as S1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CO2	0.00	7.42	7.42	0.00	7.42	7.42	0.02	0.02	0.00	0.00	8.80	8.80	8.80	0.00	0.00
O2	0.00	0.00	0.00	0.00	0.00	0.00	16.27	16.27	0.00	0.00	4.79	4.54	4.54	0.00	0.00
N2 + Ar	0.00	0.00	0.00	0.00	0.00	0.00	61.38	61.38	0.00	0.00	61.38	61.38	61.38	0.00	0.00
CO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
H2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1	0.02	0.00	0.00	0.00	0.02	0.02	0.00	0.00	0.00	5.16	0.00	0.00	0.00	0.00	0.00
C2	0.02	0.00	0.00	0.00	0.02	0.02	0.00	0.00	0.00	0.16	0.00	0.00	0.00	0.00	0.00
C3	0.02	0.00	0.00	0.00	0.02	0.02	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00
C4	0.03	0.00	0.00	0.00	0.03	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C5	0.03	0.00	0.00	0.00	0.03	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C6	0.03	0.00	0.00	0.00	0.03	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
H2O	1.54	1.47	1.47	0.00	2.94	2.94	2.51	2.51	0.00	0.00	13.04	38.57	50.10	76.37	11.53
Total Moles	5.32	16.20	16.20	7.19	16.51	16.51	80.17	80.17	0.00	5.37	93.99	113.29	124.83	76.37	11.53

STREAM NUMBER	130	131	132	134	136	138	141	142	147	148	149	152	153	154
Liquid Stream Description	ABS Recycle Ammonia Absorber	ABS Recycle ATS Finish Drum	ABS Recycle Ammonia Absorption Column ByPass	ATS Finish Pump Suction	ATS Product to Storage	Liquid to ATS Venturi	ATS Recycle Pump Suction	ATS Recycle Pump Discharge	ABS Pump Suction	ABS Recycle to ATS Section	Effuent ABS Cooler	Makeup Water to Vent Scrubber	Vent Scrubber Pump Suction	Vent Scrubber Pump Discharge
Temperature, ^{0} F	150.0	150.0	150.0	161.2	161.2	161.2	163.2	163.2	171.4	171.4	150.0	60.0	167.4	167.4
Psia	60.4	60.4	60.4	17.6	134.7	134.7	17.6	153.9	14.4	70.4	60.4	132.4	14.4	63.0
Enthalpy, Btu/Lb	-4328.8	-4328.8	-4328.8	-4272.8	-4272.8	-4272.8	-4320.9	-4320.9	-4321.5	-4321.5	-4328.8	-6881.9	-6775.4	-6775.4
Mass Flow, Lb/hr	39,141.5	5,292.8	16,278.5	8,820.5	1,082.9	8,820.5	59,760.3	59,760.3	60,713.5	60,712.9	60,712.9	898.0	30,638.7	30,638.7
Molecular Weight	39.40	39.40	39.40	40.07	40.07	40.07	39.41	39.41	39.40	39.40	39.40	18.02	18.02	18.02
Density, lb/ft3	81.33	81.33	81.33	81.66	81.66	81.66	81.14	81.14	80.92	80.92	81.33	62.39	60.83	60.83
Heat Capacity, Btu/Lb-^{0}F	0.342	0.342	0.342	0.327	0.327	0.327	0.341	0.341	0.341	0.341	0.342	0.989	0.993	0.993
Viscosity, cP	5.34	5.34	5.34	5.06	5.06	5.06	5.02	5.02	4.89	4.89	5.34	1.12	0.39	0.39
Thermal Conductivity, Btu/hr-Ft-^{0}F	0.405	0.405	0.405	0.412	0.412	0.412	0.413	0.413	0.418	0.418	0.405	0.349	0.416	0.416
Gpm	60.0	8.1	25.0	13.5	1.7	13.5	91.9	91.9	93.6	93.6	93.1	1.8	62.8	62.8
Specific Gravity @ Temperature	1.303	1.303	1.303	1.309	1.309	1.309	1.300	1.300	1.297	1.297	1.303	1.000	0.975	0.975
Specific Gravity @ 60 ^{0}F	1.324	1.324	1.324	1.332	1.332	1.332	1.324	1.324	1.324	1.324	1.324	1.000	1.000	1.000
Components Lb-Mole/Hr														
[NH4]HSO3	13.41	1.81	5.58	0.00	0.00	0.00	16.01	16.01	20.80	20.80	20.80	0.00	0.00	0.00
[NH4]2SO3	6.86	0.93	2.85	1.52	0.19	1.52	9.97	9.97	10.64	10.64	10.64	0.00	0.01	0.01
[NH4]2S2O3	133.00	17.98	55.31	32.23	3.96	32.23	206.30	206.30	206.30	206.30	206.30	0.00	0.00	0.00
[NH4]2SO4	19.02	2.57	7.91	4.28	0.53	4.28	28.97	28.97	29.50	29.50	29.50	0.00	0.00	0.00
NH4OH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
H2O	821.05	111.02	341.47	182.08	22.35	182.08	1255.22	1255.22	1273.56	1273.55	1273.55	49.85	1700.67	1700.67
Total Moles - Lb-Mole/hr	993.34	134.32	413.12	220.12	27.02	220.12	1516.47	1516.47	1540.80	1540.79	1540.79	49.85	1700.68	1700.68

Floating Roof Tank Emissions

Reporting Year	2018

Based on AP-42, November 2006, Section 7.1.3.2.

Tool Last Updated: 12/14/15 Click Here to Go Back to Cover Page

Tank Reference Parameters

Parameter Title	Notes	Parameter Symbol	Units	Value
Tank ID	Enter only Tank ID in this tab.			T-574
Tank Name		TK_{name}		T-574
Actual Location		Loc_{Act}		Gallup, NM
Location for Calculation Purposes		Loc_{Calc}		Gallup, NM
Tank Roof Type		TK_{roof}		EFR - Double-Deck
Normal Capacity		Cap	gal	1,680,000
Diameter		D	ft	85.0
Shell Height or Length		H_S	ft	40.0
External Shell Color		SC_{ext}		Tan
External Shell Paint Condition		PC_{Shell}		Good
Roof Color/Shade		RC		Tan
Roof Paint Condition		PC_{Roof}		Good
Tank Shell Solar Absorbance		α_{Shell}		0.43
Tank Roof Paint Solar Absorbance		α_{Roof}		0.43
Total Tank Paint Solar Absorbance	$= (\alpha_{Shell} + \alpha_{Roof}) / 2$ {Note A, Table 7.1-6}	α_{Tot}		0.43
Ideal Gas Constant,		R	psia ft^3 / lbmole °R	10.731
Ambient Pressure		P_A	psia	11.300
Rim-Seal System		$TK_{RimSeal}$		Mechanical-shoe/Rim-mounted
Tank Fittings		$TK_{Fittings}$		Detail

Floating Roof Parameters

Parameter Title	Notes	Parameter Symbol	Units	Value
Heated Tank?		HT		No
Liquid Bulk Temperature	Heated Tanks Only	T_B	Degrees F	--
Number of fixed roof support columns		N_{Col}		0
Effective Column Diameter	1.1 for 9" by 7" built-up column 0.7 for 8" diameter pipe column 1.0 for unknown pipe column	F_C	(col perimeter/π) ft	1.0
Internal Shell Condition		SC_{int}		Light Rust
Tank Construction		TK_{Const}		Welded
Deck Type		TK_{Deck}		--
Total Length of Deck Seams		L_{Seam}	ft	--
Area of deck	$= \pi * D^2 / 4$ {Eqn. 2-9}	A_{deck}	ft^2	5,674.5
Deck Seam Length Factor	$= L_{Seam} / A_{deck}$ {Eqn. 2-9} = 0.20 ft/ft^2 {5' wide sheet} = 0.17 ft/ft^2 {6' wide sheet} = 0.14 ft/ft^2 {7' wide sheet} = 0.33 ft/ft^2 {5' x 7.5' panels} = 0.28 ft/ft^2 {5' 12' panels} = 0.20 ft/ft^2 {most common type}	S_D	ft/ft^2	--
Deck Construction (IFR w/Bolted Decks Only)	Not applicable if L_{Seam} specified.	$TK_{DeckConst}$		--
Zero wind speed rim seal loss factor	AP-42 Table 7.1-8	K_{RA}	lb-mole/ft-yr	0.6
Wind speed dependent rim seal loss factor	AP-42 Table 7.1-8	K_{RB}	lb-mole/(mph)^n-ft-yr	0.4
Fitting Wind Speed Correction Factor	= 0.7 {EFR Tanks Only} = 0.0 {IFR and Domed EFR Tanks Only} {Eqn. 2-7}	K_V		0.7
Seal related wind speed exponent		n		1.0
Days per Year	For leap years, days = 366	t_{yr}	days/yr	365

Emission Summary

Annual Throughput, gal	**29,700,000**	**Annual Turnovers**	**17.68**
Annual Emissions, tons	**3.76**		
Month	**Normal Operation Loss, lbs**	**Emissions, tpy**	
Jan	386.78	0.193	
Feb	411.64	0.206	
Mar	572.65	0.286	
Apr	696.71	0.348	
May	658.75	0.329	
Jun	932.39	0.466	
Jul	897.35	0.449	
Aug	831.60	0.416	
Sep	747.21	0.374	
Oct	624.25	0.312	
Nov	415.43	0.208	
Dec	351.22	0.1756	

Note: The emission summary table is pulled into the Tank Emissions tab using cell references A31:B42. The emission summary must remain at this cell reference to function properly.

Calculations					1	2	3	4	5	6	7	8	9
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Reference or Equation**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**
Service					**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil				Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):			= User specified	LSR Naphtha 11	LSR Naphtha 11	LSR Naphtha 11	LSR Naphtha 11	LSR Naphtha 10	LSR Naphtha 10	LSR Naphtha 10	LSR Naphtha 10	LSR Naphtha 10
Speciation Profile	Select from list (add new in 'Speciation Input' tab):			= User specified	Naphtha - Ciniza	Naphtha - Ciniza	Naphtha - Ciniza	Naphtha - Ciniza	Naphtha - Ciniza	Naphtha - Ciniza	Naphtha - Ciniza	Naphtha - Ciniza	Naphtha - Ciniza
Speciation Profile Type				= User specified	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation
Monthly Throughput		Q	gal/month	= User specified	2,475,000	2,475,000	2,475,000	2,475,000	2,475,000	2,475,000	2,475,000	2,475,000	2,475,000
Days-In-Service	Input "0" for OOS	t_{IS}	days	= User specified	31	28	31	30	31	30	31	31	30
Shell Clingage Factor		C_S	bbl / 1000 ft^2	{Table 7.1-10}	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015
Total Deck Fitting Loss Factor	Eqn. 2-6	F_F	lb-mole/yr	= $[(N_{F1} * K_{F1}) + (N_{F2} * K_{F2}) + \ldots + (N_{Fnf} * K_{Fnf})]$ {Eqn. 2-6}	135.4	135.4	141.6	154.6	141.6	140.2	127.9	121.0	133.4
Daily Total Solar Insolation Factor		I	Btu / ft^2 day		1,020	1,320	1,710	2,170	2,440	2,570	2,390	2,190	1,860
Product Factor	Eqn. 2-3	K_C		= 0.4 {crude oils} = 1.0 {all other org. liquids}	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Deck Seam Loss per Unit Seam Length Factor	Converted K_D into monthly emissions by scaling by the time in service for the month.	K_D	lb-mole / ft-month	= 0.0 {IFR Tank with welded deck and all EFR Tanks} = 0.14 * t_{IS} / t_{yr} {bolted deck}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M of each component.	M_V	lb/lb-mole	= VOL data of tank contents {partial speciation} $M_V = \Sigma (M_{Vi} * (P_{VA,Tla,i}/P_{VA,Tla}))$	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0
Liquid Molecular Weight		M_L	lb/lb-mole	$M_L = 1 / \Sigma (Z_{Li} / M_{Li})$ {full speciation, Eqn. 1-22}	108.0	108.0	108.0	108.0	108.0	108.0	108.0	108.0	108.0
Liquid Density at 60 °F		W_L	lb/gal	= VOL data of tank contents {partial speciation} = $\Sigma (M_{L,i} * Z_{Li})$ {full speciation, Eqn. 1-22}	6.30	6.30	6.30	6.30	6.30	6.30	6.30	6.30	6.30
Average Daily Minimum Ambient Temperature		T_{AN}	°F		20.50	21.70	26.10	29.30	37.20	47.80	54.10	52.50	45.30
Average Daily Maximum Ambient Temperature		T_{AX}	°F		46.90	56.70	63.00	65.30	68.90	86.00	84.70	87.80	82.60
Daily Average Ambient Temperature		T_{AA}	°F	= $(T_{AX} + T_{AN}) / 2$ {Eqn. 1-27}	33.70	39.20	44.55	47.30	53.05	66.90	69.40	70.15	63.95
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	T_{LA}	°F	= $(0.44 * T_{AA}) + (0.56 * T_B) + (0.0079 * \alpha_{Tot} * I)$ {Eqn. 1-26}	38.05	44.57	51.24	55.56	62.22	76.52	78.40	78.47	71.15
Liquid Bulk Temperature	If T_B is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated.	T_B	degrees F	= specified by user {heated tanks only} = $T_{AA} + 6 * \alpha_{Tot} - 1$ {Eqn. 1-28}	35.28	40.78	46.13	48.88	54.63	68.48	70.98	71.73	65.53
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	$P_{VA,Tla}$	psia	*{full speciation profiles, Eqn. 1-22}:* Sum of partial true vapor pressures components. *{partial/no speciation profiles}:* Vapor pressures at T (°F) based on P_{VA} values in VOLs	3.8047	4.3417	4.9528	5.3829	5.4944	7.1476	7.3927	7.4020	6.4867
Vapor Pressure at Daily Av. Liquid Bulk Temp.	Used for vapor space expansion factor. $P_{VA,Tb}$ uses T_B.	$P_{VA,Tb}$	psia	tab at ΔT (°F) increments by interpolating between the P_{VA} values at the next highest/lowest T. $P_{VA,T} = (T - T_{Low}) / (T_{High} - T_{Low}) * (P_{VA,T,High} - P_{VA,T,Low}) + P_{VA,T,Low}$	3.5934	4.0227	4.4789	4.7290	4.7494	6.1758	6.4661	6.5553	5.8466
Vapor Pressure Function	Use T_B for calculating P_{VA} per Eqn. 2-3 Note 3.	P_f		= $(P_{VA,Tb} / P_A) / (1 + (1 - P_{VA,Tb} / P_A)^{0.5})^2$ {Eqn. 2-3}	0.1023	0.1206	0.1432	0.1603	0.1650	0.2452	0.2594	0.2600	0.2102
Average Ambient Wind Speed	Monthly Average	v	mph	= 0 {Domed EFR and all IFR tanks, Eqn. 2-3 Note 3}	11.7	11.7	12.6	14.5	12.6	12.4	10.6	9.6	11.4
Rim Seal Loss		L_R	lb/month	= $(K_{Ra} + K_{Rb} * v^n) * D * P_f * M_V * K_C * t_{IS} / t_{yr}$ {Eqn. 2-2}	292.38	311.48	437.31	537.70	503.78	714.28	679.83	624.98	568.24
Withdrawal Loss	Constant 0.943 has units of (1,000 ft^3 gal / bbl^2)	L_{WD}	lb/month	= 0.943 * (Q / (42 gal/bbl)) * C_S * W_L / D * (1 + (N_{Col} * F_C / D)) {Eqn. 2-4}	6.18	6.18	6.18	6.18	6.18	6.18	6.18	6.18	6.18
Deck Fitting Loss		L_F	lb/month	= $F_F * P_f * M_V * K_C * t_{IS} / t_{yr}$ {Eqn 2-5}	88.22	93.99	129.16	152.84	148.79	211.93	211.34	200.44	172.79
Deck Seam Loss		L_D	lb/month	= 0 {welded IFR and all EFR tanks} = $K_D * S_D * D^2 * P_f * M_V * K_C$ {Eqn. 2-9}	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Emission from Normal Operation		**L_T**	**lb/month**	**= $L_R + L_{WD} + L_F + L_D$ {Eqn. 2-1}**	**386.78**	**411.64**	**572.65**	**696.71**	**658.75**	**932.39**	**897.35**	**831.60**	**747.21**

	Calculatio	10	11	12	1	2	3	4	5	6	7	8	9
Parameter Title	**Notes**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**
Service		**Main Service**	**Main Service**	**Main Service**	**Service Change**	**Service Change**	**Service Change**	**Service Change**	**Service Change**	**Service Change**	**Service Change**	**Service Change**	**Service Change**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	--	--	--	--	--	--	--	--	--
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):	LSR Naphtha 11	LSR Naphtha 11	LSR Naphtha 11	No Service Change	No Service Change	No Service Change	No Service Change	No Service Change	No Service Change	No Service Change	No Service Change	No Service Change
Speciation Profile	Select from list (add new in 'Speciation Input' tab):	Naphtha - Ciniza	Naphtha - Ciniza	Naphtha - Ciniza	--	--	--	--	--	--	--	--	--
Speciation Profile Type		Partial Speciation	Partial Speciation	Partial Speciation	None	None	None	None	None	None	None	None	None
Monthly Throughput		2,475,000	2,475,000	2,475,000	--	--	--	--	--	--	--	--	--
Days-In-Service	Input "0" for OOS	31	30	31	--	--	--	--	--	--	--	--	--
Shell Clingage Factor		0.0015	0.0015	0.0015	--	--	--	--	--	--	--	--	--
Total Deck Fitting Loss Factor	Eqn. 2-6	129.9	136.8	139.5	--	--	--	--	--	--	--	--	--
Daily Total Solar Insolation Factor		1,500	1,100	920	--	--	--	--	--	--	--	--	--
Product Factor	Eqn. 2-3	1.0	1.0	1.0	--	--	--	--	--	--	--	--	--
Deck Seam Loss per Unit Seam Length Factor	Converted K_D into monthly emissions by scaling by the time in service for the month.	0.000	0.000	0.000	--	--	--	--	--	--	--	--	--
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M of each component.	75.0	75.0	75.0	--	--	--	--	--	--	--	--	--
Liquid Molecular Weight		108.0	108.0	108.0	--	--	--	--	--	--	--	--	--
Liquid Density at 60 °F		6.30	6.30	6.30	--	--	--	--	--	--	--	--	--
Average Daily Minimum Ambient Temperature		36.10	19.60	12.90	--	--	--	--	--	--	--	--	--
Average Daily Maximum Ambient Temperature		70.00	54.50	44.10	--	--	--	--	--	--	--	--	--
Daily Average Ambient Temperature		53.05	37.05	28.50	--	--	--	--	--	--	--	--	--
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	59.03	41.67	32.51	--	--	--	--	--	--	--	--	--
Liquid Bulk Temperature	If T_B is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated.	54.63	38.63	30.08	--	--	--	--	--	--	--	--	--
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	5.7505	4.0960	3.3916	--	--	--	--	--	--	--	--	--
Vapor Pressure at Daily Av. Liquid Bulk Temp.	Used for vapor space expansion factor. $P_{VA,Tb}$ uses T_B.	5.2881	3.8502	3.2222	--	--	--	--	--	--	--	--	--
Vapor Pressure Function	Use T_B for calculating P_{VA} per Eqn. 2-3 Note 3.	0.1759	0.1121	0.0890	--	--	--	--	--	--	--	--	--
Average Ambient Wind Speed	Monthly Average	10.9	11.9	12.3	--	--	--	--	--	--	--	--	--
Rim Seal Loss		472.46	314.75	265.95	--	--	--	--	--	--	--	--	--
Withdrawal Loss	Constant 0.943 has units of (1,000 ft^3 gal / bbl^2)	6.18	6.18	6.18	--	--	--	--	--	--	--	--	--
Deck Fitting Loss		145.62	94.50	79.09	--	--	--	--	--	--	--	--	--
Deck Seam Loss		0.00	0.00	0.00	--	--	--	--	--	--	--	--	--
Total Emission from Normal Operation		**624.25**	**415.43**	**351.22**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Parameter Title	Notes	Calculatic 10 Oct	11 Nov	12 Dec
Service		**Service Change**	**Service Change**	**Service Change**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil	--	--	--
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):	No Service Change	No Service Change	No Service Change
Speciation Profile	Select from list (add new in 'Speciation Input' tab):	--	--	--
Speciation Profile Type		None	None	None
Monthly Throughput		--	--	--
Days-In-Service	Input "0" for OOS	--	--	--
Shell Clingage Factor		--	--	--
Total Deck Fitting Loss Factor	Eqn. 2-6	--	--	--
Daily Total Solar Insolation Factor		--	--	--
Product Factor	Eqn. 2-3	--	--	--
Deck Seam Loss per Unit Seam Length Factor	Converted K_D into monthly emissions by scaling by the time in service for the month.	--	--	--
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M of each component.	--	--	--
Liquid Molecular Weight		--	--	--
Liquid Density at 60 °F		--	--	--
Average Daily Minimum Ambient Temperature		--	--	--
Average Daily Maximum Ambient Temperature		--	--	--
Daily Average Ambient Temperature		--	--	--
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	--	--	--
Liquid Bulk Temperature	If T_B is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated.	--	--	--
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	--	--	--
Vapor Pressure at Daily Av. Liquid Bulk Temp.	Used for vapor space expansion factor. $P_{VA,Tb}$ uses T_B.	--	--	--
Vapor Pressure Function	Use T_B for calculating P_{VA} per Eqn. 2-3 Note 3.	--	--	--
Average Ambient Wind Speed	Monthly Average	--	--	--
Rim Seal Loss		--	--	--
Withdrawal Loss	Constant 0.943 has units of (1,000 ft^3 gal / bbl^2)	--	--	--
Deck Fitting Loss		--	--	--
Deck Seam Loss		--	--	--
Total Emission from Normal Operation		**0.00**	**0.00**	**0.00**

Speciated Component Emissions	Species ID	Vapor MW M_{Vi}	Annual Emissions	Monthly Emissions (lb/month) $L_{Ti} = Z_{Vi} * (L_R + L_F + L_D) + Z_{Li} * L_{WD}$								
Component Name		**(lb/lb-mol)**	**lb/yr**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**
Hexane (-n)	1	86.17	75.72	3.08	3.45	5.02	6.29	6.92	10.71	10.43	9.67	8.31
Benzene	2	78.11	13.45	0.53	0.60	0.88	1.10	1.22	1.93	1.89	1.75	1.49
2,2,4-Trimethylpentane (isooctane)	3	114.23	1.14	0.05	0.05	0.07	0.09	0.10	0.16	0.16	0.15	0.13
Toluene	4	92.13	28.21	1.11	1.26	1.80	2.25	2.53	4.07	4.01	3.73	3.13
Ethylbenzene	5	106.17	2.50	0.11	0.12	0.16	0.20	0.22	0.35	0.34	0.32	0.27
Xylenes (mixed isomers)	6	106.17	13.75	0.63	0.69	0.90	1.08	1.21	1.88	1.86	1.75	1.47
Isopropyl benzene (Cumene)	7	120.2	0.35	0.02	0.02	0.02	0.03	0.03	0.04	0.04	0.04	0.04
Methyl-tert-butyl ether (MTBE)	8	88.15	0.00									
1,2,4-Trimethylbenzene	9	120.19	0.00									
Cyclohexane	10	84.16	0.00									
Gasoline (RVP 13)	11	62	0.00									
Ethyl alcohol	12	46.07	0.00									
Acetaldehyde	13	44	0.00									
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Speciated Component Emissions				Service Change - Monthly Emissions (lb/month)								
Component Name	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**
Hexane (-n)	5.78	3.40	2.68									
Benzene	1.02	0.59	0.46									
2,2,4-Trimethylpentane (isooctane)	0.09	0.05	0.04									
Toluene	2.12	1.23	0.97									
Ethylbenzene	0.19	0.12	0.10									
Xylenes (mixed isomers)	1.04	0.67	0.57									
Isopropyl benzene (Cumene)	0.03	0.02	0.02									
Methyl-tert-butyl ether (MTBE)												
1,2,4-Trimethylbenzene												
Cyclohexane												
Gasoline (RVP 13)												
Ethyl alcohol												
Acetaldehyde												
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Speciated Component Emissions

Component Name	Oct	Nov	Dec
Hexane (-n)			
Benzene			
2,2,4-Trimethylpentane (isooctane)			
Toluene			
Ethylbenzene			
Xylenes (mixed isomers)			
Isopropyl benzene (Cumene)			
Methyl-tert-butyl ether (MTBE)			
1,2,4-Trimethylbenzene			
Cyclohexane			
Gasoline (RVP 13)			
Ethyl alcohol			
Acetaldehyde			
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Floating Roof Tank Emissions

Reporting Year	*2018*

Based on AP-42, November 2006, Section 7.1.3.2.
Tool Last Updated: 12/14/15 *Click Here to Go Back to Cover Page*

Tank Reference Parameters				
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Value**
Tank ID	Enter only Tank ID in this tab.			T-576
Tank Name		TK_{name}		T-576
Actual Location		Loc_{Act}		Gallup, NM
Location for Calculation Purposes		Loc_{Calc}		Gallup, NM
Tank Roof Type		TK_{roof}		EFR - Double-Deck
Normal Capacity		Cap	gal	1,680,000
Diameter		D	ft	85.0
Shell Height or Length		H_S	ft	40.0
External Shell Color		SC_{ext}		Tan
External Shell Paint Condition		PC_{Shell}		Good
Roof Color/Shade		RC		Tan
Roof Paint Condition		PC_{Roof}		Good
Tank Shell Solar Absorbance		α_{Shell}		0.43
Tank Roof Paint Solar Absorbance		α_{Roof}		0.43
Total Tank Paint Solar Absorbance	$= (\alpha_{Shell} + \alpha_{Roof}) / 2$ {Note A, Table 7.1-6}	α_{Tot}		0.43
Ideal Gas Constant,		R	psia ft^3 / lbmole °R	10.731
Ambient Pressure		P_A	psia	11.300
Rim-Seal System		$TK_{RimSeal}$		Liquid-mounted/Rim-mounted
Tank Fittings		$TK_{Fittings}$		Detail

Floating Roof Parameters				
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Value**
Heated Tank?		HT		No
Liquid Bulk Temperature	Heated Tanks Only	T_B	Degrees F	--
Number of fixed roof support columns		N_{Col}		0
Effective Column Diameter	1.1 for 9" by 7" built-up column 0.7 for 8" diameter pipe column 1.0 for unknown pipe column	F_C	(col perimeter/π) ft	1.0
Internal Shell Condition		SC_{int}		Light Rust
Tank Construction		TK_{Const}		Welded
Deck Type		TK_{Deck}		--
Total Length of Deck Seams		L_{Seam}	ft	--
Area of deck	$= \pi * D^2 / 4$ {Eqn. 2-9}	A_{deck}	ft^2	5,674.5
Deck Seam Length Factor	$= L_{Seam} / A_{deck}$ {Eqn. 2-9} = 0.20 ft/ft^2 {5' wide sheet} = 0.17 ft/ft^2 {6' wide sheet} = 0.14 ft/ft^2 {7' wide sheet} = 0.33 ft/ft^2 {5' x 7.5' panels} = 0.28 ft/ft^2 {5' 12' panels} = 0.20 ft/ft^2 {most common type}	S_D	ft/ft^2	--
Deck Construction (IFR w/Bolted Decks Only)	Not applicable if L_{Seam} specified.	$TK_{DeckConst}$		--
Zero wind speed rim seal loss factor	AP-42 Table 7.1-8	K_{RA}	lb-mole/ft-yr	0.3
Wind speed dependent rim seal loss factor	AP-42 Table 7.1-8	K_{RB}	lb-mole/(mph)^n-ft-yr	0.6
Fitting Wind Speed Correction Factor	= 0.7 {EFR Tanks Only} = 0.0 {IFR and Domed EFR Tanks Only} {Eqn. 2-7}	K_V		0.7
Seal related wind speed exponent		n		0.3
Days per Year	For leap years, days = 366	t_{yr}	days/yr	365

Emission Summary				
Annual Throughput, gal	**67,000,000**	**Annual Turnovers**	**39.88**	Note: The emission summary table is pulled into the Tank Emissions tab using cell references A31:B42. The emission summary must remain at this cell reference to function properly.
Annual Emissions, tons	**2.14**			
Month	**Normal Operation Loss, lbs**	**Emissions, tpy**		
Jan	303.80	0.152		
Feb	325.95	0.163		
Mar	341.81	0.171		
Apr	270.72	0.135		
May	316.35	0.158		
Jun	440.48	0.220		
Jul	459.96	0.230		
Aug	449.97	0.225		
Sep	374.17	0.187		
Oct	403.67	0.202		
Nov	324.38	0.162		
Dec	267.77	0.1339		

Calculations						1	2	3	4	5	6	7	8	9
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Reference or Equation**		**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**
Service						**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil					Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):			= User specified		Lt Gas Gasoline Blendstock 13.5	Lt Gas Gasoline Blendstock 13.5	Lt Gas Gasoline Blendstock 11.5	Lt Gas Gasoline Blendstock 9	Lt Gas Gasoline Blendstock 9	Lt Gas Gasoline Blendstock 9	Lt Gas Gasoline Blendstock 9	Lt Gas Gasoline Blendstock 9	Lt Gas Gasoline Blendstock 9
Speciation Profile	Select from list (add new in 'Speciation Input' tab):			= User specified		Lt Cat Gasoline Blendstock	Lt Cat Gasoline Blendstock	Lt Cat Gasoline Blendstock	Lt Cat Gasoline Blendstock	Lt Cat Gasoline Blendstock	Lt Cat Gasoline Blendstock	Lt Cat Gasoline Blendstock	Lt Cat Gasoline Blendstock	Lt Cat Gasoline Blendstock
Speciation Profile Type				= User specified		Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation
Monthly Throughput		Q	gal/month	= User specified		5,583,333	5,583,333	5,583,333	5,583,333	5,583,333	5,583,333	5,583,333	5,583,333	5,583,333
Days-In-Service	Input "0" for OOS	t_{IS}	days	= User specified		31	28	31	30	31	30	31	31	30
Shell Clingage Factor		C_S	bbl / 1000 ft^2	{Table 7.1-10}		0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015
Total Deck Fitting Loss Factor	Eqn. 2-6	F_F	lb-mole/yr	= $[(N_{F1} * K_{F1}) + (N_{F2} * K_{F2}) + \ldots + (N_{Fnf} * K_{Fnf})]$ {Eqn. 2-6}		245.6	245.6	250.8	261.7	250.8	249.7	239.2	233.3	243.9
Daily Total Solar Insolation Factor		I	Btu / ft^2 day			1,020	1,320	1,710	2,170	2,440	2,570	2,390	2,190	1,860
Product Factor	Eqn. 2-3	K_C		= 0.4 {crude oils} = 1.0 {all other org. liquids}		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Deck Seam Loss per Unit Seam Length Factor	Converted K_D into monthly emissions by scaling by the time in service for the month.	K_D	lb-mole / ft-month	= 0.0 {IFR Tank with welded deck and all EFR Tanks} = 0.14 * t_{IS} / t_{yr} {bolted deck}		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M of each component.	M_V	lb/lb-mole	= VOL data of tank contents {partial speciation} $M_V = \Sigma (M_{Vi} * (P_{VA,Tla,i}/P_{VA,Tla}))$		67.0	67.0	67.0	67.0	67.0	67.0	67.0	67.0	67.0
Liquid Molecular Weight		M_L	lb/lb-mole	$M_L = 1 / \Sigma (Z_{Li} / M_{Li})$ {full speciation, Eqn. 1-22}		98.0	98.0	98.0	98.0	98.0	98.0	98.0	98.0	98.0
Liquid Density at 60 °F		W_L	lb/gal	= VOL data of tank contents {partial speciation} = $\Sigma (M_{L,i} * Z_{Li})$ {full speciation, Eqn. 1-22}		6.20	6.20	6.20	6.20	6.20	6.20	6.20	6.20	6.20
Average Daily Minimum Ambient Temperature		T_{AN}	°F			20.50	21.70	26.10	29.30	37.20	47.80	54.10	52.50	45.30
Average Daily Maximum Ambient Temperature		T_{AX}	°F			46.90	56.70	63.00	65.30	68.90	86.00	84.70	87.80	82.60
Daily Average Ambient Temperature		T_{AA}	°F	= $(T_{AX} + T_{AN})$ / 2 {Eqn. 1-27}		33.70	39.20	44.55	47.30	53.05	66.90	69.40	70.15	63.95
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	T_{LA}	°F	= $(0.44 * T_{AA}) + (0.56 * T_B) + (0.0079 * \alpha_{Tot} * I)$ {Eqn. 1-26}		38.05	44.57	51.24	55.56	62.22	76.52	78.40	78.47	71.15
Liquid Bulk Temperature	If T_B is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated.	T_B	degrees F	= specified by user {heated tanks only} = $T_{AA} + 6 * \alpha_{Tot} - 1$ {Eqn. 1-28}		35.28	40.78	46.13	48.88	54.63	68.48	70.98	71.73	65.53
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	$P_{VA,Tla}$	psia	*{full speciation profiles, Eqn. 1-22}:* Sum of partial true vapor pressures components. *{partial/no speciation profiles}:* Vapor pressures at T (°F) based on P_{VA} values in VOLs		4.7351	5.3941	5.1168	4.2217	4.8165	6.3188	6.5425	6.5510	5.7167
Vapor Pressure at Daily Av. Liquid Bulk Temp.	Used for vapor space expansion factor. $P_{VA,Tb}$ uses T_B.	$P_{VA,Tb}$	psia	tab at ΔT (°F) increments by interpolating between the P_{VA} values at the next highest/lowest T. $P_{VA,T} = (T - T_{Low}) / (T_{High} - T_{Low}) * (P_{VA,T,High} - P_{VA,T,Low}) + P_{VA,T,Low}$		4.4754	5.0027	4.6224	3.6869	4.1440	5.4341	5.6980	5.7791	5.1354
Vapor Pressure Function	Use T_B for calculating P_{VA} per Eqn. 2-3 Note 3.	P_f		= $(P_{VA,Tb} / P_A) / (1 + (1 - P_{VA,Tb} / P_A)^{0.5})^2$ {Eqn. 2-3}		0.1349	0.1608	0.1496	0.1164	0.1380	0.2020	0.2130	0.2134	0.1745
Average Ambient Wind Speed	Monthly Average	v	mph	= 0 {Domed EFR and all IFR tanks, Eqn. 2-3 Note 3}		11.7	11.7	12.6	14.5	12.6	12.4	10.6	9.6	11.4
Rim Seal Loss		L_R	lb/month	= $(K_{Ra} + K_{Rb} * v^n) * D * P_f * M_V * K_C * t_{IS} / t_{yr}$ {Eqn. 2-2}		101.48	109.23	114.56	89.27	105.67	149.08	156.39	153.02	126.17
Withdrawal Loss	Constant 0.943 has units of (1,000 ft^3 gal / bbl^2)	L_{WD}	lb/month	= 0.943 * (Q / (42 gal/bbl)) * C_S * W_L / D * (1 + (N_{Col} * F_C / D)) {Eqn. 2-4}		13.72	13.72	13.72	13.72	13.72	13.72	13.72	13.72	13.72
Deck Fitting Loss		L_F	lb/month	= $F_F * P_f * M_V * K_C * t_{IS} / t_{yr}$ {Eqn 2-5}		188.60	203.00	213.53	167.74	196.96	277.68	289.85	283.23	234.28
Deck Seam Loss		L_D	lb/month	= 0 {welded IFR and all EFR tanks} = $K_D * S_D * D^2 * P_f * M_V * K_C$ {Eqn. 2-9}		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Emission from Normal Operation		L_T	**lb/month**	**= $L_R + L_{WD} + L_F + L_D$ {Eqn. 2-1}**		**303.80**	**325.95**	**341.81**	**270.72**	**316.35**	**440.48**	**459.96**	**449.97**	**374.17**

	Calculatio	10	11	12	1	2	3	4	5	6	7	8	9
Parameter Title	**Notes**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**
Service		**Main Service**	**Main Service**	**Main Service**	**Service Change**	**Service Change**	**Service Change**	**Service Change**	**Service Change**	**Service Change**	**Service Change**	**Service Change**	**Service Change**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	--	--	--	--	--	--	--	--	--
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):	Lt Gas Gasoline Blendstock 11.5	Lt Gas Gasoline Blendstock 13.5	Lt Gas Gasoline Blendstock 13.5	No Service Change	No Service Change	No Service Change	No Service Change	No Service Change	No Service Change	No Service Change	No Service Change	No Service Change
Speciation Profile	Select from list (add new in 'Speciation Input' tab):	Lt Cat Gasoline Blendstock	Lt Cat Gasoline Blendstock	Lt Cat Gasoline Blendstock	--	--	--	--	--	--	--	--	--
Speciation Profile Type		Partial Speciation	Partial Speciation	Partial Speciation	None	None	None	None	None	None	None	None	None
Monthly Throughput		5,583,333	5,583,333	5,583,333	--	--	--	--	--	--	--	--	--
Days-In-Service	Input "0" for OOS	31	30	31	--	--	--	--	--	--	--	--	--
Shell Clingage Factor		0.0015	0.0015	0.0015	--	--	--	--	--	--	--	--	--
Total Deck Fitting Loss Factor	Eqn. 2-6	240.9	246.8	249.1	--	--	--	--	--	--	--	--	--
Daily Total Solar Insolation Factor		1,500	1,100	920	--	--	--	--	--	--	--	--	--
Product Factor	Eqn. 2-3	1.0	1.0	1.0	--	--	--	--	--	--	--	--	--
Deck Seam Loss per Unit Seam Length Factor	Converted K_D into monthly emissions by scaling by the time in service for the month.	0.000	0.000	0.000	--	--	--	--	--	--	--	--	--
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M of each component.	67.0	67.0	67.0	--	--	--	--	--	--	--	--	--
Liquid Molecular Weight		98.0	98.0	98.0	--	--	--	--	--	--	--	--	--
Liquid Density at 60 °F		6.20	6.20	6.20	--	--	--	--	--	--	--	--	--
Average Daily Minimum Ambient Temperature		36.10	19.60	12.90	--	--	--	--	--	--	--	--	--
Average Daily Maximum Ambient Temperature		70.00	54.50	44.10	--	--	--	--	--	--	--	--	--
Daily Average Ambient Temperature		53.05	37.05	28.50	--	--	--	--	--	--	--	--	--
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	59.03	41.67	32.51	--	--	--	--	--	--	--	--	--
Liquid Bulk Temperature	If T_B is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated.	54.63	38.63	30.08	--	--	--	--	--	--	--	--	--
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	5.9500	5.0927	4.2273	--	--	--	--	--	--	--	--	--
Vapor Pressure at Daily Av. Liquid Bulk Temp.	Used for vapor space expansion factor. $P_{VA,Tb}$ uses T_B.	5.4668	4.7910	4.0188	--	--	--	--	--	--	--	--	--
Vapor Pressure Function	Use T_B for calculating P_{VA} per Eqn. 2-3 Note 3.	0.1848	0.1487	0.1166	--	--	--	--	--	--	--	--	--
Average Ambient Wind Speed	Monthly Average	10.9	11.9	12.3	--	--	--	--	--	--	--	--	--
Rim Seal Loss		136.61	108.64	88.77	--	--	--	--	--	--	--	--	--
Withdrawal Loss	Constant 0.943 has units of (1,000 ft^3 gal / bbl^2)	13.72	13.72	13.72	--	--	--	--	--	--	--	--	--
Deck Fitting Loss		253.35	202.02	165.28	--	--	--	--	--	--	--	--	--
Deck Seam Loss		0.00	0.00	0.00	--	--	--	--	--	--	--	--	--
Total Emission from Normal Operation		**403.67**	**324.38**	**267.77**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

	Calculatio	10	11	12
Parameter Title	**Notes**	**Oct**	**Nov**	**Dec**
Service		**Service Change**	**Service Change**	**Service Change**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil	--	--	--
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):	No Service Change	No Service Change	No Service Change
Speciation Profile	Select from list (add new in 'Speciation Input' tab):	--	--	--
Speciation Profile Type		None	None	None
Monthly Throughput		--	--	--
Days-In-Service	Input "0" for OOS	--	--	--
Shell Clingage Factor		--	--	--
Total Deck Fitting Loss Factor	Eqn. 2-6	--	--	--
Daily Total Solar Insolation Factor		--	--	--
Product Factor	Eqn. 2-3	--	--	--
Deck Seam Loss per Unit Seam Length Factor	Converted K_D into monthly emissions by scaling by the time in service for the month.	--	--	--
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M of each component.	--	--	--
Liquid Molecular Weight		--	--	--
Liquid Density at 60 °F		--	--	--
Average Daily Minimum Ambient Temperature		--	--	--
Average Daily Maximum Ambient Temperature		--	--	--
Daily Average Ambient Temperature		--	--	--
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	--	--	--
Liquid Bulk Temperature	If T_B is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated.	--	--	--
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	--	--	--
Vapor Pressure at Daily Av. Liquid Bulk Temp.	Used for vapor space expansion factor. $P_{VA,Tb}$ uses T_B.	--	--	--
Vapor Pressure Function	Use T_B for calculating P_{VA} per Eqn. 2-3 Note 3.	--	--	--
Average Ambient Wind Speed	Monthly Average	--	--	--
Rim Seal Loss		--	--	--
Withdrawal Loss	Constant 0.943 has units of (1,000 ft^3 gal / bbl^2)	--	--	--
Deck Fitting Loss		--	--	--
Deck Seam Loss		--	--	--
Total Emission from Normal Operation		**0.00**	**0.00**	**0.00**

Speciated Component Emissions	Species ID	Vapor MW M_{Vi}	Annual Emissions	Monthly Emissions (lb/month) $L_{Ti} = Z_{Vi} * (L_R + L_F + L_D) + Z_{Li} * L_{WD}$								
Component Name		(lb/lb-mol)	lb/yr	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Hexane (-n)	1	86.17	59.96	2.78	3.11	4.02	4.27	5.16	7.73	8.15	7.98	6.40
Benzene	2	78.11	26.39	1.22	1.37	1.76	1.87	2.26	3.42	3.61	3.53	2.82
2,2,4-Trimethylpentane (isooctane)	3	114.23	4.98	0.24	0.27	0.34	0.36	0.43	0.63	0.66	0.65	0.52
Toluene	4	92.13	23.38	1.21	1.32	1.59	1.68	1.98	2.88	3.04	2.98	2.42
Ethylbenzene	5	106.17	2.66	0.16	0.17	0.19	0.20	0.22	0.29	0.31	0.30	0.26
Xylenes (mixed isomers)	6	106.17	11.43	0.73	0.76	0.84	0.87	0.96	1.24	1.29	1.27	1.09
Isopropyl benzene (Cumene)	7	120.2	0.09	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Methyl-tert-butyl ether (MTBE)	8	88.15	0.00									
1,2,4-Trimethylbenzene	9	120.19	0.00									
Cyclohexane	10	84.16	0.00									
Gasoline (RVP 13)	11	62	0.00									
Ethyl alcohol	12	46.07	0.00									
Acetaldehyde	13	44	0.00									
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Speciated Component Emissions				Service Change - Monthly Emissions (lb/month)								
Component Name	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Hexane (-n)	4.97	3.03	2.38									
Benzene	2.17	1.33	1.05									
2,2,4-Trimethylpentane (isooctane)	0.41	0.26	0.21									
Toluene	1.91	1.28	1.09									
Ethylbenzene	0.22	0.17	0.16									
Xylenes (mixed isomers)	0.93	0.75	0.70									
Isopropyl benzene (Cumene)	0.01	0.01	0.01									
Methyl-tert-butyl ether (MTBE)												
1,2,4-Trimethylbenzene												
Cyclohexane												
Gasoline (RVP 13)												
Ethyl alcohol												
Acetaldehyde												
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Speciated Component Emissions			
Component Name	**Oct**	**Nov**	**Dec**
Hexane (-n)			
Benzene			
2,2,4-Trimethylpentane (isooctane)			
Toluene			
Ethylbenzene			
Xylenes (mixed isomers)			
Isopropyl benzene (Cumene)			
Methyl-tert-butyl ether (MTBE)			
1,2,4-Trimethylbenzene			
Cyclohexane			
Gasoline (RVP 13)			
Ethyl alcohol			
Acetaldehyde			
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Section 7

Information Used To Determine Emissions

<u>Information Used to Determine Emissions</u> shall include the following:

- ☐ If manufacturer data are used, include specifications for emissions units <u>and</u> control equipment, including control efficiencies specifications and sufficient engineering data for verification of control equipment operation, including design drawings, test reports, and design parameters that affect normal operation.
- ☑ If test data are used, include a copy of the complete test report. If the test data are for an emissions unit other than the one being permitted, the emission units must be identical. Test data may not be used if any difference in operating conditions of the unit being permitted and the unit represented in the test report significantly effect emission rates.
- ☐ If the most current copy of AP-42 is used, reference the section and date located at the bottom of the page. Include a copy of the page containing the emissions factors, and clearly mark the factors used in the calculations.
- ☐ If an older version of AP-42 is used, include a complete copy of the section.
- ☐ If an EPA document or other material is referenced, include a complete copy.
- ☐ Fuel specifications sheet.
- ☐ If computer models are used to estimate emissions, include an input summary (if available) and a detailed report, and a disk containing the input file(s) used to run the model. For tank-flashing emissions, include a discussion of the method used to estimate tank-flashing emissions, relative thresholds (i.e., permit or major source (NSPS, PSD or Title V)), accuracy of the model, the input and output from simulation models and software, all calculations, documentation of any assumptions used, descriptions of sampling methods and conditions, copies of any lab sample analysis.

FCCU Stack Testing Information
Voltage Data
Zevenhoven & Kilpinen, 2001
Nazaroff & Alvarez-Cohen, 2001

Alliance
SOURCE TESTING

Source Test Report

Western Refining Southwest
I-40 @ Exit 39
Jamestown, NM 87347

Test Dates: July 10-12, 2018

AST Project No. 2018-0742
FCCU ESP

The Alliance Advantage 2+2+2

Regulatory Information

Title V Permit No.	P021-R2-M
NSR Permit No.	0633-M15

Source Information

Source Name	*Source ID*	*Target Parameters*
FCCU ESP	--	PM, PM2.5, CPM

Contact Information

Test Location
Western Refining Southwest
Gallup Refinery
I-40 @ Exit 49
Jamestown, NM 87347

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Alliance Source Testing, LLC (AST) has completed the source testing as described in this report. Results apply only to the source(s) tested and operating condition(s) for the specific test date(s) and time(s) identified within this report. All results are intended to be considered in their entirety, and AST is not responsible for use of less than the complete test report without written consent. This report shall not be reproduced in full or in part without written approval from the customer.

To the best of my knowledge and abilities, all information, facts and test data are correct. Data presented in this report has been checked for completeness and is accurate, error-free and legible. Onsite testing was conducted in accordance with approved internal Standard Operating Procedures. Any deviations or problems are detailed in the relevant sections on the test report.

This report is only considered valid once an authorized representative of AST has signed in the space provided below; any other version is considered draft. This document was prepared in portable document format (.pdf) and contains pages as identified in the bottom footer of this document.

8/13/2018

Shamit Nakra, QI
Alliance Source Testing, LLC

Date

TABLE OF CONTENTS

LIST OF TABLES

APPENDICES

Introduction

1.0 Introduction

Alliance Source Testing, LLC (AST) was retained by Western Refining Southwest (WNR) to conduct compliance testing at the Jamestown, New Mexico facility. The facility is subject to provisions of the Title V Permit No. P021-R2-M1. Testing was conducted to determine the emission rates of particulate matter (PM), particulate matter less than 2.5 microns (PM2.5) and condensable particulate matter (CPM) from the exhaust of the Fluid Catalytic Cracking Unit (FCCU) Electrostatic Precipitator (ESP) at two conditions. This performance test was performed at two different rates within 20% of each other using the same number of grids on the ESP. The average FCCU rate, 8,956 bpd, during condition1, was within 90% of the max rate of 9,200 bpd to determine compliance with the NSPS Subpart J particulate matter emission limit required by condition A204.I. The average rate during Condition 2 was 7,099 bpd.

1.1 Source and Control System Descriptions

The FCCU processes a maximum of 8,500 barrels/day through the unit and exhausts to the CO boiler, which flows to the ESP, which then flows to the ESP stack. The ESP is Hamon Research-Cottrell custom built for PM control and was installed in 2012.

1.2 Project Team

Personnel involved in this project are identified in the following table.

Table 1-1
Project Team

WNR Personnel	William Bailey
AST Personnel	Shamit Nakra Guy Grebe Zachary Titus

1.3 Test Protocol & Notification

Testing was conducted in accordance with the Test Protocol submitted to the New Mexico Environmental Department (NMDEQ) by WNR.

1.4 Test Program Notes

Based on the current and previous testing conducted on the FCCU, the results for Method 5 Run 1 during Condition 2 were abnormally high. The compliance for Condition 2 is shown using the average of Runs 2 and 3.

Summary of Results

2.0 Summary of Results

AST conducted compliance testing at the WNR facility in Jamestown, New Mexico on July 10-12, 2018. Testing consisted of determining the emission rates of PM, PM2.5 and CPM from the exhaust of the FCCU ESP at two conditions.

Tables 2-1 and 2-2 provide summaries of the emission testing results with comparisons to the applicable state permit limits. Any difference between the summary results listed in the following tables and the detailed results contained in appendices is due to rounding for presentation.

Table 2-1
Summary of Results – Condition 1

Run Number	Run 1	Run 2	Run 3	Average
Date	7/10/18	7/11/18	7/11/18	--
Filterable Particulate Matter Data				
Emission Rate, lb/hr	1.9	3.0	3.0	2.6
Emission Limit, lb/hr	--	--	--	8.1
Percent of Limit, %	--	--	--	**32**
Emission Rate, ton/yr	8.3	13.0	13.2	11.5
Emission Limit, ton/yr	--	--	--	35.6
Percent of Limit, %	--	--	--	**32**
Emission Factor, lb/1000 lb coke burn off	0.27	0.42	0.43	0.37
Emission Limit, lb/1000 lb coke burn off	--	--	--	1.0
Percent of Limit, %	--	--	--	**37**
Filterable Particulate Matter <2.5 Microns Data				
Emission Rate, lb/hr	0.65	0.39	0.22	0.42
Emission Factor, ton/yr	2.9	1.7	1.0	1.8
Filterable Particulate Matter <10 Microns Data				
Emission Rate, lb/hr	1.0	1.8	1.9	1.6
Emission Factor, ton/yr	4.5	7.7	8.4	6.8
Condensable Particulate Matter Data				
Emission Rate, lb/hr	1.0	1.7	1.0	1.2
Emission Factor, ton/yr	4.6	7.4	4.2	5.4
Total Particulate Matter <2.5 Microns Data [1]				
Emission Rate, lb/hr	1.7	2.1	1.2	1.7
Emission Limit, lb/hr	--	--	--	9.0
Percent of Limit, %	--	--	--	**18**
Emission Rate, ton/yr	7.4	9.1	5.2	7.2
Emission Limit, ton/yr	--	--	--	21.3
Percent of Limit, %	--	--	--	**34**
TSP/Total Particulate Matter <10 Microns Data [2]				
Emission Rate, lb/hr	2.7	3.8	3.1	3.2
Emission Limit, lb/hr	--	--	--	10.8
Percent of Limit, %	--	--	--	**30**
Emission Rate, ton/yr	11.9	16.8	13.6	14.1
Emission Limit, ton/yr	--	--	--	25.7
Percent of Limit, %	--	--	--	**55**

[1] Total PM2.5 is the summation of filterable PM2.5 and condensable PM.
[2] Total PM10 is the summation of filterable PM2.5, PM10 and condensable PM.

Table 2-2
Summary of Results – Condition 2

Run Number	Run 1 *	Run 2	Run 3	Average
Date	7/12/18	7/12/18	7/12/18	--
Filterable Particulate Matter Data				
Emission Rate, lb/hr	23.1	2.7	2.9	2.8
Emission Limit, lb/hr	--	--	--	8.1
Percent of Limit, %	--	--	--	**34**
Emission Rate, ton/yr	101.1	11.7	12.5	12.1
Emission Limit, ton/yr	--	--	--	35.6
Percent of Limit, %	--	--	--	**34**
Emission Factor, lb/1000 lb coke burn off	4.0	0.45	0.48	0.47
Emission Limit, lb/1000 lb coke burn off	--	--	--	1.0
Percent of Limit, %	--	--	--	**47**
Filterable Particulate Matter <2.5 Microns Data				
Emission Rate, lb/hr	0.47	0.42	1.2	0.70
Emission Factor, ton/yr	2.1	1.8	5.3	3.1
Filterable Particulate Matter <10 Microns Data				
Emission Rate, lb/hr	1.8	1.4	2.3	1.8
Emission Factor, ton/yr	7.9	6.0	10.2	8.0
Condensable Particulate Matter Data				
Emission Rate, lb/hr	0.67	1.1	0.84	0.87
Emission Factor, ton/yr	2.9	4.8	3.7	3.8
Total Particulate Matter <2.5 Microns Data [1]				
Emission Rate, lb/hr	1.1	1.5	2.0	1.6
Emission Limit, lb/hr	--	--	--	9.0
Percent of Limit, %	--	--	--	**17**
Emission Rate, ton/yr	5.0	6.7	9.0	6.9
Emission Limit, ton/yr	--	--	--	21.3
Percent of Limit, %	--	--	--	**32**
TSP/Total Particulate Matter <10 Microns Data/TSP [2]				
Emission Rate, lb/hr	2.9	2.9	4.4	3.4
Emission Limit, lb/hr	--	--	--	10.8
Percent of Limit, %	--	--	--	**32**
Emission Rate, ton/yr	12.9	12.7	19.1	14.9
Emission Limit, ton/yr	--	--	--	25.7
Percent of Limit, %	--	--	--	**58**

[1] Total PM2.5 is the summation of filterable PM2.5 and condensable PM.
[2] Total PM10 is the summation of filterable PM2.5, PM10 and condensable PM.
* Run 1 data for filterable particulate matter not included in the average, see section 1.4 – Test Program Notes.

Testing Methodology

3.0 Testing Methodology

The emission testing program was conducted in accordance with the test methods listed in Table 3-1. Method descriptions are provided below while quality assurance/quality control data is provided in Appendix D.

Table 3-1
Source Testing Methodology

Parameter	U.S. EPA Reference Test Methods	Notes/Remarks
Volumetric Flow Rate	1 & 2	Full Velocity Traverses
Oxygen/Carbon Dioxide	3/3A	Integrated Bag / Instrumental Analysis
Moisture Content	4	Volumetric / Gravimetric Analysis
Particulate Matter	5	Isokinetic Sampling
Particulate Matter < 2.5 microns	201A/202	Constant Rate Sampling
Mass Emission Factors	19	Fuel Factors / Heat Inputs

3.1 U.S. EPA Reference Test Methods 1 and 2 – Sampling/Traverse Points and Volumetric Flow Rate

The sampling location and number of traverse (sampling) points were selected in accordance with U.S. EPA Reference Test Method 1. To determine the minimum number of traverse points, the upstream and downstream distances were equated into equivalent diameters and compared to Figure 1-1 (for isokinetic sampling) and/or Figure 1-2 (measuring velocity alone) in U.S. EPA Reference Test Method 1.

Full velocity traverses were conducted in accordance with U.S. EPA Reference Test Method 2 to determine the average stack gas velocity pressure, static pressure and temperature. The velocity and static pressure measurement system consisted of a pitot tube and inclined manometer. The stack gas temperature was measured with a K-type thermocouple and pyrometer.

3.2 U.S. EPA Reference Test Method 3/3A – Oxygen/Carbon Dioxide

The oxygen (O_2) and carbon dioxide (CO_2) testing was conducted in accordance with U.S. EPA Reference Test Method 3/3A. One (1) integrated Tedlar bag sample was collected during each test run. The bag samples were analyzed on site with a gas analyzer. The remaining stack gas constituent was assumed to be nitrogen for the stack gas molecular weight determination. The quality control measures are described in Section 3.7.

3.3 U.S. EPA Reference Test Method 4 – Moisture Content

The stack gas moisture content was determined in accordance with U.S. EPA Reference Test Method 4. The gas conditioning train consisted of a series of chilled impingers. Prior to testing, each impinger was filled with a known quantity of water or silica gel. Post testing, the quantities of water and silica gel were measured to determine the amount of moisture condensed during the test run. Alternatively, each impinger was analyzed gravimetrically before and after each test run on the same balance to determine the amount of moisture condensed.

3.4 U.S. EPA Reference Test Method 5 – Particulate Matter

The filterable particulate matter testing was conducted accordance with U.S. EPA Reference Test Method 5. The complete sampling system consisted of a siliconized nozzle, heated glass-lined probe, pre-weighed heated quartz filter, gas conditioning train, pump and calibrated dry gas meter. The gas conditioning train consisted of four (4) chilled impingers – the first and second containing 100 mL of H_2O, an empty third impinger and the fourth containing 200-300 grams of silica gel. The probe liner and filter heating systems were maintained at a temperature of 120 ± 14°C (248 ±25°F) and the impinger temperature was maintained at 20°C (68°F) or less throughout the testing.

Following the completion of each test run, the sampling train was leak checked at a vacuum pressure greater than or equal to the highest vacuum pressure observed during the run, and the contents of the impingers were measured for moisture gain. The probe and nozzle were rinsed and brushed three (3) times with acetone to remove any adhering particulate matter. This rinse was recovered in container 2. The front half of the filter holder was rinsed three (3) times with acetone and this rinse was added to container 2. The pre-weighed quartz filter was carefully removed and placed in container 1. All containers were sealed, labeled and liquid levels marked for transport to the identified laboratory.

3.5 U.S. EPA Reference Test Methods 201A and 202 – PM < 2.5 Microns

The PM2.5 testing was conducted in accordance with U.S. EPA Reference Test Methods 201A and 202. The complete sampling system consisted of a stainless-steel nozzle, PM2.5 in-stack cyclones, in-stack filter holder, pre-weighed quartz filter, heated glass-lined probe extension, un-weighed Teflon filter, gas conditioning train, pump and calibrated dry gas meter. The gas conditioning train consisted of a coiled condenser and four (4) chilled impingers. The first and second impingers were initially empty, the third contained 100 mL of de-ionized (DI) water and the last impinger contained 200-300 grams of silica gel. The un-weighed 90 mm Teflon filter was placed between the second and third impingers. The probe liner heating system was maintained at a temperature of 248 ±25°F, and the impinger temperature was maintained at 68°F or less throughout testing. The temperature of the Teflon filter was maintained greater than 65°F but less than or equal to 85°F.

Following the completion of each test run, the sampling train was leak checked at a vacuum pressure greater than or equal to the highest vacuum pressure observed during the run. Condensate was collected in the first dry impinger, so the front-half of the sample train (the nozzle, probe, and heated pre-weighed filter) and the coil condenser were removed, and a glass bubbler was connected to the first impinger. Zero nitrogen was connected to the bubbler, and a 60-minute purge at 14 liters per minute was conducted. After the completion of the nitrogen purge the impinger contents were measured for moisture gain.

The pre-weighed quartz filter was carefully removed and placed in container 1. The front half of the filter holder and back-half of the PM2.5 cyclone were rinsed six (6) times with acetone to remove any adhering particulate matter, and these rinses were recovered in container 2. The front half of the $PM_{2.5}$ cyclone and the connecting stainless-steel tubing were rinsed six (6) times with acetone, and these rinses were recovered in container 3. All containers were sealed, labeled and liquid levels marked for transport to the identified laboratory for filterable particulate matter analysis.

The contents of impingers 1 and 2 were recovered in container CPM Cont. #1. The back half of the filterable PM filter holder, probe extension, coil condenser, impingers 1 and 2 and all connecting glassware were rinsed with DIUF water and then rinsed with acetone, followed by hexane. The water rinses were added to container CPM Cont. #1 while the solvent rinses were recovered in container CPM Cont. #2. The Teflon filter was removed from the filter holder and placed in container CPM Cont. #3. The front half of the condensable PM filter holder was rinsed with DIUF water and then with acetone, followed by hexane. The water rinse was added to container CPM

Cont. #1 while the solvent rinses were added to container CPM Cont. #2. All containers were sealed, labeled and liquid levels marked for transport to the identified laboratory for condensable particulate matter analysis.

3.6 U.S. EPA Reference Test Method 19 – Mass Emission Factors

The pollutant concentrations were converted to mass emission factors (lb/MMBtu) using procedures outlined in U.S. EPA Reference Test Method 19. The WNR provided CO_2 based fuel factor (F-Factor) of 1,840 for Coal was used in the calculations.

3.7 Quality Assurance/Quality Control – U.S. EPA Reference Test Method 3/3A

Cylinder calibration gases used met EPA Protocol 1 (+/- 2%) standards. Copies of all calibration gas certificates can be found in the Quality Assurance/Quality Control Appendix.

Low-Level gas was introduced directly to the analyzer. After adjusting the analyzer to the Low-Level gas concentration and once the analyzer reading was stable, the analyzer value was recorded. This process was repeated for the High-Level gas. For the Calibration Error Test, Low, Mid, and High-Level calibration gases were sequentially introduced directly to the analyzer. All values were within 2.0 percent of the Calibration Span or 0.5 ppmv absolute difference.

At the completion of testing, the data was also saved to the AST server. All data was reviewed by the Field Team Leader before leaving the facility. Once arriving at AST's office, all written and electronic data was relinquished to the report coordinator and then a final review was performed by the Project Manager.

Appendix A

Location: Western Refining - Gallup Refinery
Source: FCCU - Condition 1
Project No.: 2018-0742
Run No./Method: Run 1/Method 201A/202

Meter Pressure (Pm), in. Hg

$$Pm = Pb + \frac{\Delta H}{13.6}$$

where,

Pb	23.61	= barometric pressure, in. Hg
ΔH	0.402	= pressure differential of orifice, in H_2O
Pm	23.64	= in. Hg

Absolute Stack Gas Pressure (Ps), in. Hg

$$Ps = Pb + \frac{Pg}{13.6}$$

where,

Pb	23.61	= barometric pressure, in. Hg
Pg	0.90	= static pressure, in. H_2O
Ps	23.68	= in. Hg

Standard Meter Volume (Vmstd), dscf

$$Vmstd = \frac{17.647 \times Y \times Vm \times Pm}{Tm}$$

where,

Y	1.001	= meter correction factor
Vm	36.134	= meter volume, cf
Pm	23.64	= absolute meter pressure, in. Hg
Tm	545.6	= absolute meter temperature, ^oR
Vmstd	27.657	= dscf

Standard Wet Volume (Vwstd), scf

$$Vwstd = 0.04707 \times Vlc$$

where,

Vlc	81.5	= volume of H_2O collected, ml
Vwstd	3.843	= scf

Moisture Fraction (BWSmsd), dimensionless (measured)

$$BWS = \frac{Vwstd}{(Vwstd + Vmstd)}$$

where,

Vwstd	3.843	= standard wet volume, scf
Vmstd	27.657	= standard meter volume, dscf
BWSmsd	0.122	

Moisture Fraction (BWSsat), dimensionless (theoretical at saturated conditions)

$$BWSsat = \frac{10^{6.37 - \left(\frac{2,827}{Ts + 365}\right)}}{Ps}$$

where,

Ts	602.9	= stack temperature, °F
Ps	23.68	= absolute stack gas pressure, in. Hg
BWSsat	118.680	

Moisture Fraction (BWS), dimensionless

$$BWS = BWSmsd \text{ unless } BWSsat < BWSmsd$$

where,

BWSsat	118.680	= moisture fraction (theoretical at saturated conditions)
BWSmsd	0.122	= moisture fraction (measured)
BWS	0.122	

Alliance SOURCE TESTING

Location: Western Refining - Gallup Refinery
Source: FCCU - Condition 1
Project No.: 2018-0742
Run No./Method: Run 1/Method 201A/202

Molecular Weight (DRY) (Md), lb/lb-mole

$$Md = (0.44 \times \% CO_2) + (0.32 \times \% O_2) + (0.28 (100 - \% CO_2 - \% O_2))$$

where,

CO_2	13.4	= carbon dioxide concentration, %
O_2	3.5	= oxygen concentration, %
Md	30.28	= lb/lb mol

Molecular Weight (WET) (Ms), lb/lb-mole

$$Ms = Md (1 - BWS) + 18 (BWS)$$

where,

Md	30.28	= molecular weight (DRY), lb/lb mol
BWS	0.122	= moisture fraction, dimensionless
Ms	28.79	= lb/lb mol

Average Velocity (Vs), ft/sec

$$Vs = 85.49 \times Cp \times (\Delta P^{1/2})\, avg \times \sqrt{\frac{Ts}{Ps \times Ms}}$$

where,

Cp	0.84	= pitot tube coefficient
$\Delta P^{1/2}$	0.800	= velocity head of stack gas, (in. $H_2O)^{1/2}$
Ts	1062.9	= absolute stack temperature, °R
Ps	23.68	= absolute stack gas pressure, in. Hg
Ms	28.79	= molecular weight of stack gas, lb/lb mol
Vs	71.7	= ft/sec

Average Stack Gas Flow at Stack Conditions (Qa), acfm

$$Qa = 60 \times Vs \times As$$

where,

Vs	71.7	= stack gas velocity, ft/sec
As	#REF!	= cross-sectional area of stack, ft^2
Qa	84,498	= acfm

Average Stack Gas Flow at Standard Conditions (Qs), dscfm

$$Qs = 17.647 \times Qa \times (1 - BWS) \times \frac{Ps}{Ts}$$

where,

Qa	84,498	= average stack gas flow at stack conditions, acfm
BWS	0.122	= moisture fraction, dimensionless
Ps	23.68	= absolute stack gas pressure, in. Hg
Ts	1062.9	= absolute stack temperature, °R
Qs	29,163	= dscfm

Filterable PM2.5 Concentration ($C_{FPM2.5}$), grain/dscf

$$C_{FPM2.5} = \frac{M_{FPM2.5} \times 0.0154}{Vmstd}$$

where,

$M_{FPM2.5}$	4.7	= FPM2.5 mass, mg
Vmstd	27.657	= standard meter volume, dscf
$C_{FPM2.5}$	0.0026	= grain/dscf

Location: Western Refining - Gallup Refinery
Source: FCCU - Condition 1
Project No.: 2018-0742
Run No./Method: Run 1/Method 201A/202

Filterable PM2.5 Emission Rate ($ER_{PM2.5}$), lb/hr

$$ER_{FPM2.5} = \frac{C_{FPM2.5} \times Qs \times 60}{7.0E+03}$$

where,

$C_{FPM2.5}$	0.0026	= FPM2.5 concentration, grain/dscf
Qs	29,163	= average stack gas flow at standard conditions, dscfm
$ER_{FPM2.5}$	0.65	= lb/hr

Filterable PM2.5 Emission Rate ($ER_{FPM2.5tpy}$), ton/yr

$$ER_{FPM2.5tpy} = \frac{ER_{FPM2.5} \times 8{,}760}{2.0E+03}$$

where,

$ER_{FPM2.5}$	0.65	= FPM2.5 emission rate, lb/hr
$ER_{FPM2.5tpy}$	2.9	= ton/yr

Filterable PM2.5 Emission Factor ($EF_{FPM2.5}$), lb/1000 lb coke burn off

$$EF_{FPM2.5} = \frac{ER_{FPM2.5}}{FR}$$

where,

$ER_{FPM2.5}$	0.65	= FPM2.5 emission rate, lb/hr
FR	7.06	= Coke Burn Rate, 1000 lb/hr
$EF_{FPM2.5}$	0.093	= lb/1000 lb coke burn off

Filterable PM2.5 Emission Factor ($EF_{FPM2.5}$), lb/MMBtu

$$EF_{FPM2.5} = \frac{C_{FPM2.5} \times F}{7.0E+03} \times \frac{100}{CO_2}$$

where,

$C_{FPM2.5}$	0.0026	= FPM2.5 concentration, grain/dscf
F	1,840	= carbon dioxide based fuel factor, dscf/MMBtu
CO_2	13.4	= carbon dioxide concentration, %
$EF_{FPM2.5}$	0.0051	= lb/MMBtu

Condensable PM Concentration (C_{CPM}), grain/dscf

$$C_{CPM} = \frac{M_{CPM} \times 0.0154}{Vmstd}$$

where,

M_{CPM}	7.5	= condensable PM mass, mg
Vmstd	27.657	= standard meter volume, dscf
C_{CPM}	0.0042	= grain/dscf

Condensable PM Emission Rate (ER_{CPM}), lb/hr

$$ER_{CPM} = \frac{C_{CPM} \times Qs \times 60}{7.0E+03}$$

where,

C_{CPM}	0.0042	= condensable PM concentration, grain/dscf
Qs	29,163	= average stack gas flow at standard conditions, dscfm
ER_{CPM}	1.0	= lb/hr

Location: Western Refining - Gallup Refinery
Source: FCCU - Condition 1
Project No.: 2018-0742
Run No./Method: Run 1/Method 201A/202

Condensable PM Emission Rate (ER_{CPMtpy}), ton/yr

$$ER_{CPMtpy} = \frac{ER_{CPM} \times 8,760}{2.0E+03}$$

where,

ER_{CPM}	1.0	= condensable PM emission rate, lb/hr
ER_{CPMtpy}	4.6	= ton/yr

Condensable PM Emission Factor (EF_{CPM}), lb/1000 lb coke burn off

$$EF_{CPM} = \frac{ER_{CPM}}{FR}$$

where,

ER_{CPM}	1.0	= condensable PM emission rate, lb/hr
FR	7.06	= Coke Burn Rate, 1000 lb/hr
EF_{CPM}	0.15	= lb/1000 lb coke burn off

Condensable PM Emission Factor (EF_{CPM}), lb/MMBtu

$$EF_{CPM} = \frac{C_{CPM} \times F}{7.0E+03} \times \frac{100}{CO_2}$$

where,

C_{CPM}	0.0042	= condensable PM concentration, grain/dscf
F	1,840	= carbon dioxide based fuel factor, dscf/MMBtu
CO_2	13.4	= carbon dioxide concentration, %
EF_{CPM}	0.0082	= lb/MMBtu

PM2.5 Concentration ($C_{PM2.5}$), grain/dscf

$$C_{PM2.5} = \frac{M_{PM2.5} \times 0.0154}{Vmstd}$$

where,

$M_{PM2.5}$	12.2	= PM2.5 mass, mg
Vmstd	27.657	= standard meter volume, dscf
$C_{PM2.5}$	0.0068	= grain/dscf

PM2.5 Emission Rate ($ER_{PM2.5}$), lb/hr

$$ER_{PM2.5} = \frac{C_{PM2.5} \times Qs \times 60}{7.0E+03}$$

where,

$C_{PM2.5}$	0.0068	= PM2.5 concentration, grain/dscf
Qs	29,163	= average stack gas flow at standard conditions, dscfm
$ER_{PM2.5}$	1.7	= lb/hr

PM2.5 Emission Rate ($ER_{PM2.5tpy}$), ton/yr

$$ER_{PM2.5tpy} = \frac{ER_{PM2.5} \times 8,760}{2.0E+03}$$

where,

$ER_{PM2.5}$	1.7	= PM2.5 emission rate, lb/hr
$ER_{PM2.5tpy}$	7.4	= ton/yr

Location:	**Western Refining - Gallup Refinery**
Source:	**FCCU - Condition 1**
Project No.:	**2018-0742**
Run No./Method:	Run 1/Method 201A/202

PM2.5 Emission Factor ($EF_{PM2.5}$), lb/1000 lb coke burn off

$$EF_{PM2.5} = \frac{ER_{PM2.5}}{FR}$$

where,

$ER_{PM2.5}$	1.7	= PM2.5 emission rate, lb/hr
FR	7.06	= Coke Burn Rate, 1000 lb/hr
$EF_{PM2.5}$	0.24	= lb/1000 lb coke burn off

PM2.5 Emission Factor ($EF_{PM2.5}$), lb/MMBtu

$$EF_{PM2.5} = \frac{C_{PM2.5} \times F}{7.0E+03} \times \frac{100}{CO_2}$$

where,

$C_{PM2.5}$	0.0068	= PM2.5 concentration, grain/dscf
F	1,840	= carbon dioxide based fuel factor, dscf/MMBtu
CO_2	13.4	= carbon dioxide concentration, %
$EF_{PM2.5}$	0.013	= lb/MMBtu

Appendix B

Condition 1

Alliance SOURCE TESTING

Emissions Data

Location: Western Refining - Gallup Refinery
Source: FCCU - Condition 1
Project No.: 2018-0742
Parmater: PM2.5/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		7/10/18	7/11/18	7/11/18	-
Start Time		16:00	9:35	13:55	-
Stop Time		17:30	11:15	15:30	-
INPUT DATA					
Run Time, min	(θ)	84.0	84.1	84.0	84.0
Coke Burn Rate, 1000 lb/hr	(FR)	7.06	7.04	7.01	7.04
Fuel Factor, dscf/MMBtu (CO2)	(F-Factor)	1,840	1,840	1,840	1,840
Barometric Pressure, in. Hg	(Pb)	23.61	23.51	23.51	23.54
Meter Correction Factor	(Y)	1.001	1.001	1.001	1.001
Orifice Calibration Value	(Δ H@)	1.660	1.660	1.660	1.660
Meter Volume, ft^3	(Vm)	36.134	35.805	36.115	36.018
Meter Temperature, °F	(Tm)	85.6	77.3	76.7	79.8
Meter Temperature, °R	(Tm)	545.6	537.3	536.7	539.8
Meter Orifice Pressure, in. WC	(Δ H)	0.402	0.400	0.402	0.401
Volume H2O Collected, mL	(Vlc)	81.5	73.9	83.1	79.5
Nozzle Diameter, in	(Dn)	0.215	0.215	0.215	0.215
Area of Nozzle, ft^2	(An)	0.00025	0.00025	0.00025	0.00025
Filterable PM2.5 Mass, mg	($M_{FPM2.5}$)	4.7	2.8	1.6	3.0
Filterable PM10 Mass, mg	(M_{FPM10})	7.3	12.5	14.0	11.3
Condensable PM Mass, mg	(M_{CPM})	7.5	12.1	7.0	8.9
PM2.5 Mass, mg (FPM2.5 + CPM)	($M_{PM2.5}$)	12.2	14.9	8.6	11.9
PM10 Mass, mg (FPM2.5 + FPM10 + CPM)	(M_{PM10})	19.5	27.4	22.6	23.2
CALCULATED DATA					
Standard Meter Volume, ft^3	(Vmstd)	27.657	27.712	27.982	27.784
Standard Water Volume, ft^3	(Vwstd)	3.843	3.484	3.918	3.748
Sampling Rate, acfm	(Qs)	0.95	0.95	0.97	0.96
Moisture Fraction Measured	(BWSmsd)	0.122	0.112	0.123	0.119
Moisture Fraction @ Saturation	(BWSsat)	118.680	120.014	119.391	119.362
Moisture Fraction	(BWS)	0.122	0.112	0.123	0.119
Meter Pressure, in Hg	(Pm)	23.64	23.54	23.54	23.573
Volume at Nozzle, ft^3	(Vn)	80.124	79.766	81.508	80.466
Isokinetic Sampling Rate, % (+/- 20%)	(I)	88.0	87.4	89.1	88.2
DGM Calibration Check Value, % (+/- 5%)	(Y_{qa})	4.1	3.8	4.6	4.2
Particle Cut Diameter (PM2.5), um (+/-0.25 um)	(D_{50IV})	2.52	2.55	2.48	2.51
Particle Cut Diameter (PM10), um (+/-1 um)	(D_{50})	9.8	9.8	9.6	9.7
Reynolds Number	(Nre)	1,856	1,837	1,878	1857
Cunningham Correction Factor	(C)	1.167	1.168	1.168	1.168
Gas Viscosity, mpoise	(μ)	284.69	285.79	284.73	285.07
RECALCULATED DATA					
Cunningham Correction Factor	(Cr)	1.166	1.165	1.169	1.167
Particle Cut Diameter, um	(D_{50-1})	2.52	2.55	2.48	2.52
Ratio of D_{50} and D_{50-1} (+/- 0.01)	(Z)	1.00	1.00	1.00	1.00
EMISSION CALCULATIONS					
Filterable PM2.5 Concentration, grain/dscf	($C_{FPM2.5}$)	0.0026	0.0016	0.00088	0.0017
Filterable PM2.5 Emission Rate, lb/hr	($ER_{FPM2.5}$)	0.65	0.39	0.22	0.42
Filterable PM2.5 Emission Rate, ton/yr	($ER_{FPM2.5tpy}$)	2.9	1.7	1.0	1.8
Filterable PM10 Concentration, grain/dscf	(C_{FPM10})	0.0041	0.0069	0.0077	0.0062
Filterable PM10 Emission Rate, lb/hr	(ER_{FPM10})	1.0	1.8	1.9	1.6
Filterable PM10 Emission Rate, ton/yr	($ER_{FPM10tpy}$)	4.5	7.7	8.4	6.8
Condensable PM Concentration, grain/dscf	(C_{CPM})	0.0042	0.0067	0.0039	0.0049
Condensable PM Emission Rate, lb/hr	(ER_{CPM})	1.0	1.7	1.0	1.2
Condensable PM Emission Rate, ton/yr	(ER_{CPMtpy})	4.6	7.4	4.2	5.4
PM2.5 Concentration, grain/dscf	($C_{PM2.5}$)	0.0068	0.0083	0.0047	0.0066
PM2.5 Emission Rate, lb/hr	($ER_{PM2.5}$)	1.7	2.1	1.2	1.7
PM2.5 Emission Rate, ton/yr	($ER_{PM2.5tpy}$)	7.4	9.1	5.2	7.2
PM10 Concentration, grain/dscf	(C_{PM10})	0.011	0.015	0.012	0.013
PM10 Emission Rate, lb/hr	(ER_{PM10})	2.7	3.8	3.1	3.2
PM10 Emission Rate, ton/yr	($ER_{PM10tpy}$)	11.9	16.8	13.6	14.1

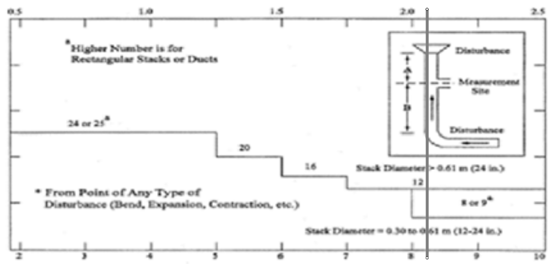
Method 1 Data

Alliance SOURCE TESTING

Location Western Refining - Gallup Refinery
Source FCCU - Condition 1
Project No. 2018-0742
Date: 07/10/18

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	71.75	in
Nipple Length:	11.75	in
Depth of Duct:	60.00	in
Cross Sectional Area of Duct:	19.63	ft^2
No. of Test Ports:	2	
Number of Readings per Point:	1	
Distance A:	70.5	ft
Distance A Duct Diameters:	14.1	(must be > 0.5)
Distance B:	41.0	ft
Distance B Duct Diameters:	8.2	(must be > 2)
Minimum Number of Traverse Points:	12	
Actual Number of Traverse Points:	12	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

Number of traverse points on a diameter

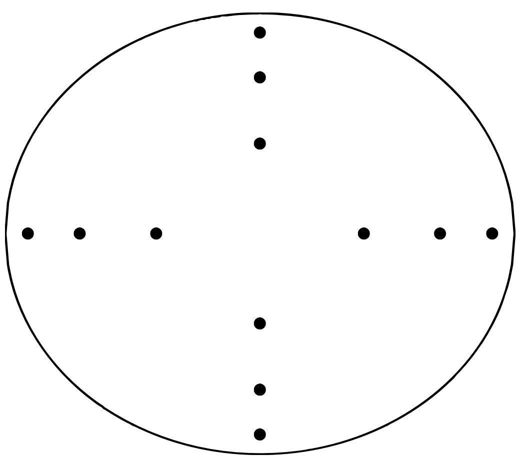
	2	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

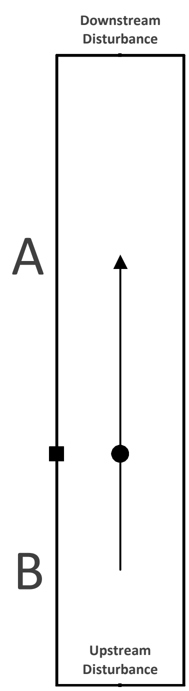
*Percent of stack diameter from inside wall to traverse point.

Traverse Point	**% of Diameter**	**Distance from inside wall**	**Distance from outside of port**
1	4.4	2.64	14.39
2	14.6	8.76	20.51
3	29.6	17.76	29.51
4	70.4	42.24	53.99
5	85.4	51.24	62.99
6	95.6	57.36	69.11
7	--	--	--
8	--	--	--
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--

Stack Diagram
A = 70.5 ft.
B = 41 ft.
Depth of Duct = 60 in.

Cross Sectional Area





Cyclonic Flow Check

Location Western Refining - Gallup Refinery
Source FCCU - Condition 1
Project No. 2018-0742
Date 7/10/18

Sample Point	Angle (ΔP=0)
1	2
2	5
3	3
4	4
5	2
6	2
7	0
8	5
9	4
10	8
11	3
12	5
Average	4

Alliance SOURCE TESTING

VFR Data

Location: Western Refining - Gallup Refinery
Source: FCCU - Condition 1
Project No.: 2018-0742
Parameter: PM2.5/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		7/10/18	7/11/18	7/11/18	-
Start Time		4:00 PM	9:35 AM	1:55 PM	-
Stop Time		5:30 PM	11:15 AM	3:30 PM	-
Run Time, min		84.0	84.1	84.0	84.0
VELOCITY HEAD, in. WC					
Point 1		0.66	0.65	0.67	0.66
Point 2		0.67	0.68	0.69	0.68
Point 3		0.69	0.70	0.70	0.70
Point 4		0.71	0.70	0.72	0.71
Point 5		0.54	0.56	0.58	0.56
Point 6		0.61	0.60	0.59	0.60
Point 7		0.65	0.65	0.65	0.65
Point 8		0.67	0.66	0.67	0.67
Point 9		0.69	0.68	0.68	0.68
Point 10		0.65	0.64	0.64	0.64
Point 11		0.53	0.54	0.52	0.53
Point 12		0.62	0.64	0.60	0.62
CALCULATED DATA					
Square Root of ΔP	(in. WC)$^{1/2}$	0.800	0.800	0.801	0.800
Pitot Tube Coefficient	(Cp)	0.84	0.84	0.84	0.84
Barometric Pressure, in. Hg	(Pb)	23.61	23.51	23.51	23.54
Static Pressure, in. WC	(Pg)	0.90	0.90	0.90	0.90
Stack Pressure, in. Hg	(Ps)	23.68	23.58	23.58	23.61
Stack Cross-sectional Area, ft^2	(As)	19.63	19.63	19.63	19.63
Temperature, °F	(Ts)	602.9	603.9	603.2	603.3
Temperature, °R	(Ts)	1062.9	1063.9	1063.2	1063.3
Moisture Fraction Measured	(BWSmsd)	0.122	0.112	0.123	0.119
Moisture Fraction @ Saturation	(BWSsat)	118.680	120.014	119.391	119.362
Moisture Fraction	(BWS)	0.122	0.112	0.123	0.119
CO2 Concentration, %	(CO2)	13.4	13.3	13.3	13.3
O2 Concentration, %	(O2)	3.5	3.7	3.6	3.6
Molecular Weight, lb/lb-mole (dry)	(Md)	30.28	30.28	30.27	30.28
Molecular Weight, lb/lb-mole (wet)	(Ms)	28.79	28.90	28.76	28.82
Velocity, ft/sec	(Vs)	71.7	71.8	72.0	71.8
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	84,498	84,612	84,823	84,644
At Standard Conditions, dscfm	(Qs)	29,163	29,392	29,117	29,224

Location Western Refining - Gallup Refinery
Source FCCU - Condition 1
Project No. 2018-0742
Parameter: PM2.5/CPM

Run 1	**Date:**	7/10/18			
Impinger No.	**1**	**2**	**3**	**4**	**Total**
Contents	empty	empty	water	silica	--
Initial Volume, g	476.3	690.9	636.3	922.2	2725.7
Final Volume, g	533.1	690.7	636.5	946.9	2807.2
Gain, g	56.8	-0.2	0.2	24.7	81.5
Run 2	**Date:**	7/11/18			
Impinger No.	**1**	**2**	**3**	**4**	**Total**
Contents	empty	empty	water	silica	--
Initial Volume, g	478.8	692.2	636.2	939.4	2746.6
Final Volume, g	541.6	690.5	638.2	950.2	2820.5
Gain, g	62.8	-1.7	2.0	10.8	73.9
Run 3	**Date:**	7/11/18			
Impinger No.	**1**	**2**	**3**	**4**	**Total**
Contents	empty	empty	water	silica	--
Initial Volume, g	380.2	613.3	707.2	898.7	2599.4
Final Volume, g	432.6	617.4	719.0	913.5	2682.5
Gain, g	52.4	4.1	11.8	14.8	83.1

Location:	Western Refining - Gallup Refinery	Start Time:	16:00	Source:	FCCU - Condition 1
Date:	7/10/18	Run 1	VALID	End Time:	17:30
Project No.:	2018-0742	Parameter:	PM2.5/CPM		

STACK DATA (EST)			EQUIPMENT		
Moisture:	12.2	% est.	METER BOX:	M5-9	
Barometric:	23.61	in. Hg	Y:	1.001	
Static Press:	0.9	in. WC	ΔH@ (in. WC):	1.660	
Stack Press:	23.68	in. Hg	Probe ID/Material:	PR-706-3	glass
CO_2:	13.4	%	Pitot ID Cp/Cp':	PR-706-3	PR-706-3
O_2:	3.5	%	Pitot Type Cp/Cp':	s-type	s-type
N_2/CO:	83.1	%	Pitot Cp/Cp':	0.84	0.840
Md:	30.284	lb/lb-mole	Nozzle ID/Dn (in.):	7	0.215
Ms:	28.79	lb/lb-mole	No. Pts/Time (min):	12	84

STACK DATA (EST)					+/- 50°F ΔH				VOLUME CORRECTION	
Ts (°F):	605	Tm (°F):	90		Ts-50°	555	Ts+50°	655	Mid 1 (cf):	
		Est. Qs:	0.913	cfm	Est. Qs:	0.867	Est. Qs:	0.958	Mid 2 (cf):	
		Est. μ_s:	285.11	mpoise	Est. μ_s:	274.83	Est. μ_s:	295.21	Mid 3 (cf):	
		Est. ΔH:	0.403	in. WC	Est. ΔH:	0.397	Est. ΔH:	0.401	Total (cf):	

LEAK CHECKS	Pre	Mid 1	Mid 2	Post	FILTER NO.
					2742
Leak Rate (cfm):	0.015	--	--	0.005	
Pump Vac (in Hg):	15	--	--	5	
Pitot Tube:	PASS	--	--	PASS	

STACK DATA (FINAL)		
Pb:	23.61	in. Hg
Pg:	0.9	in. WC
CO2:	13.4	%
O2:	3.5	%

Sample Point	Dwell Time (min)	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in. WC)	Gas Temperatures (°F) DGM Average	Gas Temperatures (°F) Stack	Orifice Press. ΔH (in. WC) Ideal	Orifice Press. ΔH (in. WC) Actual	Pump Vac (in. Hg)	Gas Temps (°F) Probe	Gas Temps (°F) Filter	Gas Temps (°F) Imp. Exit	Gas Temps (°F) CPM Filter	Qs (acfm)	% ISO	D_{50} [10 um]	D_{50} [2.5 um]
				Amb.	Amb.				Amb.	Amb.	Amb.	Amb.				
				88	87				87	86	86	86				
A-1	7.11	793.126	0.66	105	601	0.42	0.41	3	248	245	64	80	0.94	85.0	9.87	2.57
2	7.16	796.240	0.67	94	601	0.41	0.41	3	246	247	63	79	0.93	84.2	9.88	2.57
3	7.27	799.310	0.69	87	603	0.40	0.41	3	245	248	62	78	0.96	84.8	9.74	2.51
4	7.38	802.450	0.71	85	604	0.40	0.40	3	244	242	62	78	0.96	83.5	9.75	2.52
5	6.43	805.620	0.54	83	603	0.40	0.40	3	246	253	62	77	0.97	97.0	9.66	2.48
6	6.84	808.410	0.61	82	604	0.40	0.39	3	246	249	64	78	0.96	90.7	9.71	2.50
B-1	7.06	811.350	0.65	86	600	0.40	0.41	3	241	241	65	78	0.95	86.9	9.77	2.52
2	7.16	814.380	0.67	84	603	0.40	0.40	3	245	250	66	78	0.96	86.1	9.74	2.51
3	7.27	817.460	0.69	81	606	0.40	0.40	3	242	245	64	77	0.97	86.1	9.65	2.48
4	7.06	820.610	0.65	80	604	0.40	0.40	3	241	243	62	74	0.95	87.2	9.76	2.52
5	6.37	823.610	0.53	80	603	0.40	0.39	3	241	252	62	74	0.92	92.9	10.02	2.64
6	6.89	826.220	0.62	80	603	0.40	0.40	3	242	244	61	73	0.99	92.5	9.51	2.42
	-	829.260				-							-	--	-	-
Final DGM:		829.260														

Actual Run Time		Vm		ΔP		Tm		Ts		Max Vac.	ΔH		% ISO		D_{50} 10 um	D_{50} 2.5 um	Yqa
84.0	min	36.134	ft^3	0.64	in. WC	85.6	°F	602.9	°F	3	0.402	in. WC	88.0		9.75	2.52	4.1

Location:	Western Refining - Gallup Refinery	Start Time:	9:35	Source:	FCCU - Condition 1
Date:	7/11/18	Run 2	VALID	End Time:	11:15
Project No.:	2018-0742	Parameter:	PM2.5/CPM		

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)				+/- 50°F ΔH				VOLUME CORRECTION	
Moisture:	11.2	% est.	METER BOX:	M5-9		Ts (°F):	603	Tm (°F):	86	Ts-50°	553	Ts+50°	653	Mid 1 (cf):	
Barometric:	23.61	in. Hg	Y:	1.001		Est. Qs:	0.910	cfm		Est. Qs:	0.864	Est. Qs:	0.955	Mid 2 (cf):	
Static Press:	0.90	in. WC	ΔH@ (in. WC):	1.660		Est. μ_s:	284.69	mpoise		Est. μ_s:	274.40	Est. μ_s:	294.80	Mid 3 (cf):	
Stack Press:	23.68	in. Hg	Probe ID/Material:	PR-706-3	glass	Est. ΔH:	0.407	in. WC		Est. ΔH:	0.396	Est. ΔH:	0.400	Total (cf):	

						LEAK CHECKS				FILTER NO.	STACK DATA (FINAL)		
CO_2:	13.4 %	Pitot ID Cp/Cp':	PR-706-3	PR-706-3		Pre	Mid 1	Mid 2	Post	2617	Pb:	23.51	in. Hg
O_2:	3.5 %	Pitot Type Cp/Cp':	s-type	s-type									
N_2/CO:	83.1 %	Pitot Cp/Cp':	0.84	0.840	Leak Rate (cfm):	0.016	--	--	0.007		Pg:	0.9	in. WC
Md:	30.28 lb/lb-mole	Nozzle ID/Dn (in.):	7	0.215	Pump Vac (in Hg):	15	--	--	5		CO2:	13.3	%
Ms:	28.91 lb/lb-mole	No. Pts/Time (min):	12	84	Pitot Tube:	PASS	--	--	PASS		O2:	3.7	%

Sample Point	Dwell Time (min)	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in. WC)	Gas Temperatures (°F) DGM Average	Stack	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temps (°F) Probe	Filter	Imp. Exit	CPM Filter	Qs (acfm)	% ISO	D_{50} [10 um]	D_{50} [2.5 um]
				Amb.	Amb.				Amb.	Amb.	Amb.	Amb.				
				--	--				--	--	--	--				
A-1	7.06	841.620	0.65	74	604	0.40	0.40	3	250	245	65	83	0.96	88.0	9.69	2.50
2	7.22	844.650	0.68	74	605	0.40	0.40	3	244	247	64	83	0.96	85.8	9.72	2.50
3	7.32	847.740	0.70	74	607	0.40	0.40	3	240	240	64	76	0.96	84.8	9.71	2.50
4	7.32	850.880	0.70	77	604	0.40	0.40	3	240	250	62	73	0.95	83.4	9.81	2.54
5	6.55	853.990	0.56	77	603	0.40	0.40	3	243	240	61	72	0.94	92.5	9.86	2.57
6	6.78	856.750	0.60	77	605	0.40	0.40	3	245	242	60	71	0.95	90.2	9.81	2.54
B-1	7.06	859.630	0.65	77	602	0.40	0.40	3	240	253	60	70	0.95	86.9	9.78	2.53
2	7.11	862.640	0.66	78	604	0.40	0.40	3	253	246	59	73	0.95	86.3	9.78	2.53
3	7.22	865.680	0.68	79	605	0.40	0.40	3	242	251	59	71	0.95	84.5	9.83	2.55
4	7.00	868.750	0.64	79	603	0.40	0.40	3	243	245	60	73	0.94	87.1	9.82	2.55
5	6.43	871.730	0.54	80	602	0.40	0.40	3	245	246	61	74	0.94	94.3	9.85	2.56
6	7.00	874.460	0.64	81	603	0.40	0.40	3	241	241	63	76	0.94	86.3	9.88	2.57
-	-	877.425				-							-	--	-	-
Final DGM:		877.425														

Actual Run Time		Vm		ΔP		Tm		Ts		Max Vac.	ΔH		% ISO		D_{50} 10 um	D_{50} 2.5 um	Yqa
84.1	min	35.805	ft^3	0.64	in. WC	77.3	°F	603.9	°F	3	0.400	in. WC	87.4		9.82	2.55	3.8

Location:	Western Refining - Gallup Refinery	Start Time:	13:55	Source:	FCCU - Condition 1
Date:	7/11/18	Run 3	VALID	End Time:	15:30
Project No.:	2018-0742	Parameter:	PM2.5/CPM		

STACK DATA (EST)			EQUIPMENT		
Moisture:	12.3	% est.	METER BOX:	M5-9	
Barometric:	23.51	in. Hg	Y:	1.001	
Static Press:	0.90	in. WC	ΔH@ (in. WC):	1.660	
Stack Press:	23.58	in. Hg	Probe ID/Material:	PR-706-3	glass
CO_2:	13.3	%	Pitot ID Cp/Cp':	PR-706-3	PR-706-3
O_2:	3.7	%	Pitot Type Cp/Cp':	s-type	s-type
N_2/CO:	83.0	%	Pitot Cp/Cp':	0.84	0.840
Md:	30.28	lb/lb-mole	Nozzle ID/Dn (in.):	7	0.215
Ms:	28.77	lb/lb-mole	No. Pts/Time (min):	12	84

STACK DATA (EST)					+/- 50°F ΔH				VOLUME CORRECTION	
Ts (°F):	604	Tm (°F):	77		Ts-50°	554	Ts+50°	654	Mid 1 (cf):	
Est. Qs:	0.913	cfm			Est. Qs:	0.868	Est. Qs:	0.958	Mid 2 (cf):	
Est. μ_s:	284.89	mpoise			Est. μ_s:	274.60	Est. μ_s:	295.00	Mid 3 (cf):	
Est. ΔH:	0.392	in. WC			Est. ΔH:	0.396	Est. ΔH:	0.400	Total (cf):	

LEAK CHECKS	Pre	Mid 1	Mid 2	Post	FILTER NO.
Leak Rate (cfm):	0.014	--	--	0.010	2665
Pump Vac (in Hg):	15	--	--	5	
Pitot Tube:	PASS	--	--	PASS	

STACK DATA (FINAL)		
Pb:	23.51	in. Hg
Pg:	0.9	in. WC
CO2:	13.3	%
O2:	3.6	%

Sample Point	Dwell Time (min)	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in. WC)	Gas Temperatures (°F) DGM Average	Gas Temperatures (°F) Stack	Orifice Press. ΔH (in. WC) Ideal	Orifice Press. ΔH (in. WC) Actual	Pump Vac (in. Hg)	Gas Temps (°F) Probe	Gas Temps (°F) Filter	Gas Temps (°F) Imp. Exit	Gas Temps (°F) CPM Filter	Qs (acfm)	% ISO	D_{50} [10 um]	D_{50} [2.5 um]
				Amb.	Amb.				Amb.	Amb.	Amb.	Amb.				
				--	--				--	--	--	--				
A-1	7.16	879.540	0.67	78	602	0.39	0.42	4	242	239	65	79	0.99	89.3	9.48	2.41
2	7.26	882.700	0.69	76	604	0.39	0.40	4	244	243	64	76	1.00	88.2	9.47	2.40
3	7.32	885.900	0.70	76	605	0.39	0.40	4	245	248	64	74	0.98	85.9	9.60	2.46
4	7.42	889.060	0.72	76	603	0.39	0.40	4	246	248	64	74	0.98	85.0	9.57	2.44
5	6.66	892.280	0.58	75	602	0.39	0.40	4	246	251	64	74	0.95	92.2	9.75	2.52
6	6.72	895.090	0.59	79	601	0.40	0.40	4	245	245	64	75	0.95	90.9	9.79	2.54
B-1	7.05	897.930	0.65	76	600	0.39	0.40	4	245	246	63	76	0.95	86.7	9.77	2.53
2	7.16	900.900	0.67	76	602	0.39	0.40	4	245	247	65	77	0.95	85.4	9.79	2.54
3	7.21	903.910	0.68	77	605	0.39	0.40	4	244	246	62	78	0.98	87.7	9.56	2.44
4	7.00	907.050	0.64	77	606	0.39	0.40	4	243	247	62	78	0.98	89.7	9.62	2.47
5	6.31	910.070	0.52	77	604	0.39	0.40	4	245	243	61	78	0.98	99.7	9.60	2.46
6	6.77	912.800	0.60	77	604	0.39	0.40	4	246	245	61	77	0.95	90.3	9.78	2.54
-	-	915.655				-							-	--	-	-
Final DGM:		915.655														

Actual Run Time		Vm		ΔP		Tm		Ts		Max Vac.	ΔH		% ISO		D_{50} 10 um	D_{50} 2.5 um	Yqa
84.0	min	36.115	ft^3	0.64	in. WC	76.7	°F	603.2	°F	4	0.402	in. WC	89.1		9.65	2.48	4.6

Location Western Refining - Gallup Refinery
Source FCCU - Condition 1
Project No. 2018-0742
Parameter TSP

Run Number		Run 1	Run 2	Run 3	Average
Date		7/10/18	7/11/18	7/11/18	--
Start Time		16:00	9:35	13:55	--
Stop Time		17:30	11:05	15:25	--
Run Time, min	(θ)	72.0	60.0	60.0	64.0
INPUT DATA					
Coke Burn Rate, 1000 lb/hr	(FR)	7.06	7.04	7.01	7.04
Fuel Factor (CO2), dscf/MMBtu	(Fc)	1,840	1,840	1,840	1,840
Barometric Pressure, in. Hg	(Pb)	23.61	23.51	25.51	24.21
Meter Correction Factor	(Y)	0.978	0.978	0.978	0.978
Orifice Calibration Value	(ΔH @)	1.764	1.764	1.764	1.764
Meter Volume, ft^3	(Vm)	40.552	32.970	33.154	35.559
Meter Temperature, °F	(Tm)	77.8	75.0	74.8	75.8
Meter Temperature, °R	(Tm)	537.8	535.0	534.8	535.8
Meter Orifice Pressure, in. WC	(ΔH)	0.762	0.768	0.777	0.769
Volume H_2O Collected, mL	(Vlc)	103.1	71.5	79.8	84.8
Nozzle Diameter, in	(Dn)	0.230	0.230	0.230	0.230
Area of Nozzle, ft^2	(An)	0.00029	0.00029	0.00029	0.00029
Filterable PM Mass, mg	(Mn)	15.4	19.2	20.7	18.4
ISOKINETIC DATA					
Standard Meter Volume, ft^3	(Vmstd)	30.801	25.065	27.358	27.741
Standard Water Volume, ft^3	(Vwstd)	4.853	3.366	3.756	3.992
Moisture Fraction Measured	(BWSmsd)	0.136	0.118	0.121	0.125
Moisture Fraction @ Saturation	(BWSsat)	117.857	119.062	109.673	115.531
Moisture Fraction	(BWS)	0.136	0.118	0.121	0.125
Meter Pressure, in Hg	(Pm)	23.67	23.57	25.57	24.27
Volume at Nozzle, ft^3	(Vn)	90.626	72.629	73.261	78.839
Isokinetic Sampling Rate, (%)	(I)	101.2	97.4	102.8	100.5
DGM Calibration Check Value, (+/- 5%)	(Y_{qa})	0.7	-2.1	1.9	0.2
EMISSION CALCULATIONS					
Filterable PM Concentration, grain/dscf	(C_s)	0.0077	0.012	0.012	0.010
Filterable PM Emission Rate, lb/hr	(PMR)	1.9	3.0	3.0	2.6
Filterable PM Emission Rate, ton/yr	(ER_{FPM})	8.3	13.0	13.2	11.5
Filterable PM Emission Factor, lb/1000 lb coke burn off	(EF_{PM})	0.27	0.42	0.43	0.37

Alliance SOURCE TESTING

Volumetric Flow Rate Data

Location Western Refining - Gallup Refinery
Source FCCU - Condition 1
Project No. 2018-0742
Parameter TSP

Run Number		Run 1	Run 2	Run 3	Average
Date		7/10/18	7/11/18	7/11/18	--
Start Time		16:00	9:35	13:55	--
Stop Time		17:30	11:05	15:25	--
Run Time, min		72.0	60.0	60.0	64.0
VELOCITY HEAD, in. WC					
Point 1		0.65	0.65	0.70	0.67
Point 2		0.66	0.66	0.71	0.68
Point 3		0.69	0.69	0.55	0.64
Point 4		0.72	0.72	0.61	0.68
Point 5		0.53	0.53	0.63	0.56
Point 6		0.64	0.64	0.50	0.59
Point 7		0.61	0.61	0.65	0.62
Point 8		0.53	0.53	0.69	0.58
Point 9		0.63	0.63	0.65	0.64
Point 10		0.70	0.70	0.62	0.67
Point 11		0.67	0.67	0.64	0.66
Point 12		0.65	0.65	0.65	0.65
CALCULATED DATA					
Square Root of ΔP, (in. WC)$^{1/2}$	(ΔP)	0.799	0.800	0.795	0.798
Pitot Tube Coefficient	(Cp)	0.84	0.84	0.84	0.84
Barometric Pressure, in. Hg	(Pb)	23.61	23.51	25.51	24.21
Static Pressure, in. WC	(Pg)	0.90	0.90	0.90	0.90
Stack Pressure, in. Hg	(Ps)	23.68	23.58	25.58	24.28
Stack Cross-sectional Area, ft^2	(As)	19.63	19.63	19.63	19.63
Temperature, °F	(Ts)	601.9	602.8	602.7	602.5
Temperature, °R	(Ts)	1061.9	1062.8	1062.7	1062.5
Moisture Fraction Measured	(BWSmsd)	0.136	0.118	0.121	0.125
Moisture Fraction @ Saturation	(BWSsat)	117.857	119.062	109.673	115.531
Moisture Fraction	(BWS)	0.136	0.118	0.121	0.125
CO_2 Concentration, %	(CO_2)	13.4	13.3	13.3	13.3
O_2 Concentration, %	(O_2)	3.5	3.7	3.6	3.6
Molecular Weight, lb/lb-mole (dry)	(Md)	30.28	30.28	30.27	30.28
Molecular Weight, lb/lb-mole (wet)	(Ms)	28.61	28.82	28.79	28.74
Velocity, ft/sec	(Vs)	71.9	71.8	68.6	70.8
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	84,650	84,610	80,794	83,351
At Standard Conditions, dscfm	(Qs)	28,773	29,202	30,172	29,382

Alliance SOURCE TESTING

Method 4 Data

Location	**Western Refining - Gallup Refinery**
Source	**FCCU - Condition 1**
Project No.	**2018-0742**
Parameter	**TSP**
Analysis	**Gravimetric**

Run 1	**Date:**	7/10/18			
Impinger No.	**1**	**2**	**3**	**4**	**Total**
Contents	H2O	H2O	Empty	Silica	--
Initial Mass, g	690.0	747.6	653.4	891.0	2982.0
Final Mass, g	760.5	758.7	665.5	900.4	3085.1
Gain	70.5	11.1	12.1	9.4	103.1
Run 2	**Date:**	7/11/18			
Impinger No.	**1**	**2**	**3**	**4**	**Total**
Contents	H2O	H2O	Empty	Silica	--
Initial Mass, g	760.5	758.7	665.5	900.4	3085.1
Final Mass, g	819.9	769.6	658.6	908.5	3156.6
Gain	59.4	10.9	-6.9	8.1	71.5
Run 3	**Date:**	7/11/18			
Impinger No.	**1**	**2**	**3**	**4**	**Total**
Contents	H2O	H2O	Empty	Silica	--
Initial Mass, g	629.2	623.7	654.7	888.3	2795.9
Final Mass, g	679.3	637.4	660.0	899.0	2875.7
Gain	50.1	13.7	5.3	10.7	79.8

Isokinetic Field Data

Location:	Western Refining - Gallup Refinery	Start Time:	16:00	Source:	FCCU - Condition 1
Date: 7/10/18	Run 1 VALID	End Time:	17:30	Project No.: 2018-0742	Parameter: TSP

STACK DATA (EST)			EQUIPMENT		STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)			MOIST. DATA
Moisture:	12.5	% est.	Meter Box ID:	CCI-3	Est. Tm:	101	°F	9915	Pb:	23.61	in. Hg	Vlc (ml)
Barometric:	23.61	in. Hg	Y:	0.978	Est. Ts:	602	°F		Pg:	0.90	in. WC	103.1
Static Press:	0.90	in. WC	ΔH @ (in.WC):	1.764	Est. ΔP:	0.64	in. WC		CO_2:	13.4	%	K-FACTOR
Stack Press:	23.68	in. Hg	Probe ID:	PR707.3	Est. Dn:	0.252	in.		O_2:	3.5	%	1.249
CO_2:	2.0	%	Liner Material:	glass	Target Rate:	0.70	scfm					
O_2:	17.0	%	Pitot ID:	PR707-3								
N_2/CO:	81.0	%	Pitot Cp/Type:	0.84 S-type								
Md:	29.00	lb/lb-mole	Nozzle ID:	sil-03								
Ms:	27.63	lb/lb-mole	Nozzle Dn (in.):	0.230								

LEAK CHECKS	Pre	Mid 1	Mid 2	Post
Leak Rate (cfm):	0.006	--	--	0.005
Vacuum (in Hg):	15	--	--	5
Pitot Tube:	Pass	--	--	

Check Pt.	Initial	Final	Corr.
Mid 1 (cf)			-
Mid 2 (cf)			-
Mid 3 (cf)			-
Mid-Point Leak Check Vol (cf):			-

Sample Pt.	Sample Time (minutes) Begin	Sample Time (minutes) End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Gas Temperatures (°F) Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Orifice Press. ΔH (in. WC) Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	Aux Amb.	% ISO	Vs (fps)
													-		
A-1	0.00	6.00	805.048	0.65	81	600	0.79	0.80	3	246	228	59	-	107.3	73.71
2	6.00	12.00	808.800	0.66	80	601	0.80	0.80	3	242	235	55	-	103.8	74.30
3	12.00	18.00	812.450	0.69	80	602	0.83	0.80	3	239	238	60	-	99.1	76.01
4	18.00	24.00	816.010	0.72	79	602	0.87	0.80	3	247	239	60	-	100.6	77.65
5	24.00	30.00	819.695	0.53	79	602	0.64	0.65	1	237	223	59	-	95.6	66.62
6	30.00	36.00	822.700	0.64	79	603	0.77	0.77	1	241	237	58	-	95.0	73.24
B-1	36.00	42.00	825.980	0.61	77	600	0.73	0.73	1	239	218	57	-	101.7	71.40
2	42.00	48.00	829.400	0.53	77	600	0.64	0.64	1	238	219	59	-	100.5	66.55
3	48.00	54.00	832.550	0.63	76	601	0.75	0.75	1	239	220	60	-	95.3	72.60
4	54.00	60.00	835.800	0.70	75	604	0.83	0.83	1	239	225	60	-	94.9	76.63
5	60.00	66.00	839.200	0.67	75	603	0.80	0.80	1	240	233	60	-	91.6	74.94
6	66.00	72.00	842.410	0.65	75	605	0.77	0.77	1	242	232	59	-	92.5	73.88
	72.00	--	845.600										-		-
	Final DGM:		845.600												

RESULTS

Run Time	Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y_{qa}
72.0 min	40.552 ft^3	0.64 in. WC	77.8 °F	601.9 °F	3	0.762 in. WC	101.2	0.136	0.7

Alliance SOURCE TESTING

Isokinetic Field Data

Location:	Western Refining - Gallup Refinery	Start Time:	9:35	Source:	FCCU - Condition 1
Date:	7/11/18 Run 2 VALID	End Time:	11:05	Project No.:	2018-0742 Parameter: TSP

STACK DATA (EST)		EQUIPMENT		STACK DATA (EST)		FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	12.5 % est.	Meter Box ID:	CCI-3	Est. Tm:	78 °F	9914	Pb:	23.51 in. Hg	Vlc (ml)
Barometric:	23.61 in. Hg	Y:	0.978	Est. Ts:	602 °F		Pg:	0.90 in. WC	71.5
Static Press:	0.90 in. WC	ΔH @ (in.WC):	1.764	Est. ΔP:	0.64 in. WC		CO_2:	13.3 %	K FACTOR
Stack Press:	23.68 in. Hg	Probe ID:	PR707.3	Est. Dn:	0.257 in.		O_2:	3.7 %	1.20
CO_2:	2.0 %	Liner Material:	glass	Target Rate:	0.70 scfm				
O_2:	17.0 %	Pitot ID:	PR707-3						
N_2/CO:	81.0 %	Pitot Cp/Type:	0.84 S-type						
Md:	29.00 lb/lb-mole	Nozzle ID:	sil-03						
Ms:	27.63 lb/lb-mole	Nozzle Dn (in.):	0.230						

LEAK CHECKS	Pre	Mid 1	Mid 2	Post
Leak Rate (cfm):	0.000	--	--	0.000
Vacuum (in Hg):	12	--	--	3
Pitot Tube:		--	--	

Check Pt.	Initial	Final	Corr.
Mid 1 (cf)			-
Mid 2 (cf)			-
Mid 3 (cf)			-
Mid-Point Leak Check Vol (cf):			-

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average (Amb. ---)	Stack (Amb. --)	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe (Amb. --)	Filter (Amb. --)	Imp Exit (Amb. --)	Aux (Amb. --)	% ISO	Vs (fps)
A-1	0.00	5.00	846.060	0.65	72	601	0.77	0.80	1	259	252	65	-	100.9	73.74
2	5.00	10.00	848.950	0.66	72	603	0.78	0.79	1	255	251	58	-	90.9	74.37
3	10.00	15.00	851.570	0.69	73	602	0.82	0.82	1	252	149	58	-	95.1	76.01
4	15.00	20.00	854.380	0.72	74	604	0.86	0.86	1	258	253	58	-	95.5	77.72
5	20.00	25.00	857.265	0.53	75	603	0.63	0.63	1	254	250	57	-	95.6	66.65
6	25.00	30.00	859.750	0.64	75	603	0.76	0.76	1	254	249	58	-	94.9	73.24
B-1	30.00	35.00	862.460	0.61	75	602	0.73	0.73	1	254	252	60	-	96.3	71.47
2	35.00	40.00	865.145	0.53	76	602	0.63	0.64	1	251	250	63	-	103.1	66.62
3	40.00	45.00	867.830	0.63	76	601	0.75	0.76	1	251	248	53	-	101.4	72.60
4	45.00	50.00	870.710	0.70	77	603	0.84	0.84	1	255	250	49	-	95.4	76.60
5	50.00	55.00	873.570	0.67	77	603	0.80	0.80	1	257	251	47	-	95.8	74.94
6	55.00	60.00	876.380	0.65	78	604	0.78	0.78	1	259	252	50	-	91.6	73.84
--	60.00	--	879.030										-		-

Final DGM: 879.030

RESULTS	Run Time	Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y_{qa}
	60.0 min	32.970 ft^3	0.64 in. WC	75.0 °F	602.8 °F	1	0.768 in. WC	97.4	0.118	-2.1

Alliance SOURCE TESTING

Isokinetic Field Data

Location:	Western Refining - Gallup Refinery	Start Time:	13:55	Source:	FCCU - Condition 1
Date:	7/11/18 Run 3 VALID	End Time:	15:25	Project No.:	2018-0742 Parameter: TSP

STACK DATA (EST)		EQUIPMENT		STACK DATA (EST)		FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	12.5 % est.	Meter Box ID:	CCI-3	Est. Tm:	75 °F	9913	Pb:	25.51 in. Hg	Vlc (ml)
Barometric:	23.61 in. Hg	Y:	0.978	Est. Ts:	603 °F		Pg:	0.90 in. WC	79.8
Static Press:	0.90 in. WC	ΔH @ (in.WC):	1.764	Est. ΔP:	0.64 in. WC		CO_2:	13.3 %	K FACTOR
Stack Press:	23.68 in. Hg	Probe ID:	PR707.3	Est. Dn:	0.258 in.		O_2:	3.6 %	1.190
CO_2:	2.0 %	Liner Material:	glass	Target Rate:	0.70 scfm				
O_2:	17.0 %	Pitot ID:	PR707-3						
N_2/CO:	81.0 %	Pitot Cp/Type:	0.84 S-type						
Md:	29.00 lb/lb-mole	Nozzle ID:	sil-03						
Ms:	27.63 lb/lb-mole	Nozzle Dn (in.):	0.230						

LEAK CHECKS	Pre	Mid 1	Mid 2	Post
Leak Rate (cfm):	0.000	--	--	0.000
Vacuum (in Hg):	15	--	--	5
Pitot Tube:		--	--	

Check Pt.	Initial	Final	Corr.
Mid 1 (cf)			-
Mid 2 (cf)			-
Mid 3 (cf)			-
Mid-Point Leak Check Vol (cf):			-

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	DGM Average (°F) Amb. ---	Stack (°F) Amb. --	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Probe Amb. --	Filter Amb. --	Imp Exit Amb. --	Aux Amb. --	% ISO	Vs (fps)
A-1	0.00	5.00	879.548	0.70	74	600	0.84	0.84	1	254	180	58	-	94.9	76.49
2	5.00	10.00	882.380	0.71	74	602	0.85	0.85	1	255	183	52	-	94.3	77.10
3	10.00	15.00	885.210	0.55	74	605	0.65	0.70	1	244	185	52	-	103.2	67.96
4	15.00	20.00	887.935	0.61	74	604	0.73	0.71	1	245	229	52	-	94.2	71.54
5	20.00	25.00	890.555	0.63	74	603	0.75	0.80	1	245	245	53	-	97.4	72.66
6	25.00	30.00	893.310	0.50	74	601	0.60	0.70	1	245	247	54	-	104.3	64.67
B-1	30.00	35.00	895.940	0.65	74	600	0.78	0.80	1	243	245	56	-	103.3	73.71
2	35.00	40.00	898.910	0.69	75	600	0.83	0.85	1	244	245	58	-	90.6	75.94
3	40.00	45.00	901.600	0.65	76	605	0.78	0.78	1	247	246	58	-	97.2	73.88
4	45.00	50.00	904.400	0.62	76	603	0.74	0.74	1	248	247	59	-	95.9	72.09
5	50.00	55.00	907.100	0.64	76	604	0.76	0.77	1	243	249	59	-	97.6	73.27
6	55.00	60.00	909.890	0.65	76	605	0.78	0.78	1	244	244	62	-	97.6	73.88
--	60.00	--	912.702										-		-
	Final DGM:		912.702												

RESULTS

Run Time	Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y_{qa}
60.0 min	33.154 ft^3	0.63 in. WC	74.8 °F	602.7 °F	1	0.777 in. WC	102.8	0.121	1.9

Condition 2

Alliance SOURCE TESTING

Emissions Data

Location: Western Refining - Gallup Refinery
Source: FCCU - Condition 2
Project No.: 2018-0742
Parmater: PM2.5/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		7/12/18	7/12/18	7/12/18	-
Start Time		8:10	11:45	16:45	-
Stop Time		9:50	13:20	18:30	-
INPUT DATA					
Run Time, min	(θ)	84.0	83.8	83.9	83.9
Coke Burn Rate, 1000 lb/hr	(FR)	5.83	5.87	5.91	5.87
Fuel Factor, dscf/MMBtu (CO2)	(F-Factor)	1,840	1,840	1,840	1,840
Barometric Pressure, in. Hg	(Pb)	23.56	23.56	23.56	23.56
Meter Correction Factor	(Y)	1.001	1.001	1.001	1.001
Orifice Calibration Value	(Δ H@)	1.660	1.660	1.660	1.660
Meter Volume, ft^3	(Vm)	35.190	36.140	35.530	35.620
Meter Temperature, °F	(Tm)	66.3	83.3	73.0	74.2
Meter Temperature, °R	(Tm)	526.3	543.3	533.0	534.2
Meter Orifice Pressure, in. WC	(Δ H)	0.397	0.411	0.400	0.403
Volume H2O Collected, mL	(Vlc)	84.2	83.0	83.2	83.5
Nozzle Diameter, in	(Dn)	0.215	0.215	0.215	0.215
Area of Nozzle, ft^2	(An)	0.00025	0.00025	0.00025	0.00025
Filterable PM2.5 Mass, mg	($M_{FPM2.5}$)	3.6	3.2	9.2	5.3
Filterable PM10 Mass, mg	(M_{FPM10})	13.8	10.5	17.7	14.0
Condensable PM Mass, mg	(M_{CPM})	5.1	8.4	6.4	6.6
PM2.5 Mass, mg (FPM2.5 + CPM)	($M_{PM2.5}$)	8.7	11.6	15.6	12.0
PM10 Mass, mg (FPM2.5 + FPM10 + CPM)	(M_{PM10})	22.5	22.1	33.3	26.0
CALCULATED DATA					
Standard Meter Volume, ft^3	(Vmstd)	27.860	27.722	27.777	27.786
Standard Water Volume, ft^3	(Vwstd)	3.970	3.913	3.921	3.935
Sampling Rate, acfm	(Qs)	0.96	0.95	0.95	0.95
Moisture Fraction Measured	(BWSmsd)	0.125	0.124	0.124	0.124
Moisture Fraction @ Saturation	(BWSsat)	108.882	104.668	104.983	106.178
Moisture Fraction	(BWS)	0.125	0.124	0.124	0.124
Meter Pressure, in Hg	(Pm)	23.59	23.59	23.59	23.590
Volume at Nozzle, ft^3	(Vn)	80.243	79.336	79.527	79.702
Isokinetic Sampling Rate, % (+/- 20%)	(I)	93.7	93.4	93.5	93.5
DGM Calibration Check Value, % (+/- 5%)	(Y_{qa})	3.6	3.3	3.6	3.5
Particle Cut Diameter (PM2.5), um (+/-0.25 um)	(D_{50IV})	2.48	2.49	2.49	2.49
Particle Cut Diameter (PM10), um (+/-1 um)	(D_{50})	9.7	9.7	9.7	9.7
Reynolds Number	(Nre)	1,884	1,886	1,885	1885
Cunningham Correction Factor	(C)	1.166	1.165	1.165	1.165
Gas Viscosity, mpoise	(μ)	282.41	281.31	281.44	281.72
RECALCULATED DATA					
Cunningham Correction Factor	(Cr)	1.167	1.165	1.165	1.166
Particle Cut Diameter, um	(D_{50-1})	2.48	2.49	2.49	2.49
Ratio of D_{50} and D_{50-1} (+/- 0.01)	(Z)	1.00	1.00	1.00	1.00
EMISSION CALCULATIONS					
Filterable PM2.5 Concentration, grain/dscf	($C_{FPM2.5}$)	0.0020	0.0018	0.0051	0.0030
Filterable PM2.5 Emission Rate, lb/hr	($ER_{FPM2.5}$)	0.47	0.42	1.2	0.70
Filterable PM2.5 Emission Rate, ton/yr	($ER_{FPM2.5tpy}$)	2.1	1.8	5.3	3.1
Filterable PM10 Concentration, grain/dscf	(C_{FPM10})	0.0076	0.0058	0.0098	0.0078
Filterable PM10 Emission Rate, lb/hr	(ER_{FPM10})	1.8	1.4	2.3	1.8
Filterable PM10 Emission Rate, ton/yr	($ER_{FPM10tpy}$)	7.9	6.0	10.2	8.0
Condensable PM Concentration, grain/dscf	(C_{CPM})	0.0028	0.0047	0.0035	0.0037
Condensable PM Emission Rate, lb/hr	(ER_{CPM})	0.67	1.1	0.84	0.87
Condensable PM Emission Rate, ton/yr	(ER_{CPMtpy})	2.9	4.8	3.7	3.8
PM2.5 Concentration, grain/dscf	($C_{PM2.5}$)	0.0048	0.0064	0.0086	0.0066
PM2.5 Emission Rate, lb/hr	($ER_{PM2.5}$)	1.1	1.5	2.0	1.6
PM2.5 Emission Rate, ton/yr	($ER_{PM2.5tpy}$)	5.0	6.7	9.0	6.9
PM10 Concentration, grain/dscf	(C_{PM10})	0.012	0.012	0.018	0.014
PM10 Emission Rate, lb/hr	(ER_{PM10})	2.9	2.9	4.4	3.4
PM10 Emission Rate, ton/yr	($ER_{PM10tpy}$)	12.9	12.7	19.1	14.9

Method 4 Data

Location Western Refining - Gallup Refinery
Source FCCU - Condition 2
Project No. 2018-0742
Parameter: PM2.5/CPM

Run 1	**Date:**	7/12/18			
Impinger No.	**1**	**2**	**3**	**4**	**Total**
Contents	empty	empty	water	silica	--
Initial Volume, g	478.4	692.7	637.7	952.3	2761.1
Final Volume, g	543.1	690.5	644.7	967.0	2845.3
Gain, g	64.7	-2.2	7.0	14.7	84.2
Run 2	**Date:**	7/12/18			
Impinger No.	**1**	**2**	**3**	**4**	**Total**
Contents	empty	empty	water	silica	--
Initial Volume, g	381.5	614.9	719.8	882.9	2599.1
Final Volume, g	440.6	614.6	730.6	896.3	2682.1
Gain, g	59.1	-0.3	10.8	13.4	83.0
Run 3	**Date:**	7/12/18			
Impinger No.	**1**	**2**	**3**	**4**	**Total**
Contents	empty	empty	water	silica	--
Initial Volume, g	478.8	694.3	645.9	935.4	2754.4
Final Volume, g	539.6	694.8	653.9	949.3	2837.6
Gain, g	60.8	0.5	8.0	13.9	83.2

VFR Data

Location: Western Refining - Gallup Refinery
Source: FCCU - Condition 2
Project No.: 2018-0742
Parameter: PM2.5/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		7/12/18	7/12/18	7/12/18	-
Start Time		8:10 AM	11:45 AM	4:45 PM	-
Stop Time		9:50 AM	1:20 PM	6:30 PM	-
Run Time, min		84.0	83.8	83.9	83.9
VELOCITY HEAD, in. WC					
Point 1		0.51	0.50	0.51	0.51
Point 2		0.52	0.54	0.55	0.54
Point 3		0.59	0.58	0.60	0.59
Point 4		0.60	0.62	0.61	0.61
Point 5		0.57	0.55	0.55	0.56
Point 6		0.59	0.58	0.56	0.58
Point 7		0.54	0.53	0.50	0.52
Point 8		0.55	0.57	0.55	0.56
Point 9		0.59	0.58	0.59	0.59
Point 10		0.61	0.60	0.60	0.60
Point 11		0.59	0.59	0.60	0.59
Point 12		0.57	0.55	0.56	0.56
CALCULATED DATA					
Square Root of ΔP	(in. WC)$^{1/2}$	0.754	0.752	0.751	0.752
Pitot Tube Coefficient	(Cp)	0.84	0.84	0.84	0.84
Barometric Pressure, in. Hg	(Pb)	23.56	23.56	23.56	23.56
Static Pressure, in. WC	(Pg)	0.60	0.60	0.60	0.60
Stack Pressure, in. Hg	(Ps)	23.60	23.60	23.60	23.60
Stack Cross-sectional Area, ft^2	(As)	19.63	19.63	19.63	19.63
Temperature, °F	(Ts)	590.3	584.8	585.2	586.7
Temperature, °R	(Ts)	1050.3	1044.8	1045.2	1046.7
Moisture Fraction Measured	(BWSmsd)	0.125	0.124	0.124	0.124
Moisture Fraction @ Saturation	(BWSsat)	108.882	104.668	104.983	106.178
Moisture Fraction	(BWS)	0.125	0.124	0.124	0.124
CO2 Concentration, %	(CO2)	12.6	12.6	12.6	12.6
O2 Concentration, %	(O2)	4.5	4.4	4.5	4.5
Molecular Weight, lb/lb-mole (dry)	(Md)	30.20	30.19	30.20	30.19
Molecular Weight, lb/lb-mole (wet)	(Ms)	28.67	28.68	28.69	28.68
Velocity, ft/sec	(Vs)	67.5	67.1	67.0	67.2
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	79,476	79,021	78,968	79,155
At Standard Conditions, dscfm	(Qs)	27,589	27,608	27,578	27,592

Location:	Western Refining - Gallup Refinery	Start Time:	8:10	Source:	FCCU - Condition 2
Date:	7/12/18 Run 1 VALID	End Time:	9:50	Project No.:	2018-0742 Parameter: PM2.5/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)				+/- 50°F ΔH				VOLUME CORRECTION
Moisture:	12.5	% est.	METER BOX:	M5-9		Ts (°F): 590	Tm (°F): 80			Ts-50°: 540		Ts+50°: 640		Mid 1 (cf):
Barometric:	23.56	in. Hg	Y:	1.001			Est. Qs:	0.902	cfm	Est. Qs: 0.856		Est. Qs: 0.947		Mid 2 (cf):
Static Press:	0.6	in. WC	ΔH@ (in. WC):	1.660			Est. μ_s:	282.72	mpoise	Est. μ_s: 272.38		Est. μ_s: 292.87		Mid 3 (cf):
Stack Press:	23.60	in. Hg	Probe ID/Material:	PR-706-3	glass		Est. ΔH:	0.392	in. WC	Est. ΔH: 0.397		Est. ΔH: 0.402		Total (cf):

						LEAK CHECKS				FILTER NO.	STACK DATA (FINAL)		
CO_2:	12.6 %	Pitot ID Cp/Cp':	PR-706-3	PR-706-3									
O_2:	4.5 %	Pitot Type Cp/Cp':	s-type	s-type		Pre	Mid 1	Mid 2	Post	2766	Pb:	23.56	in. Hg
N_2/CO:	82.9 %	Pitot Cp/Cp':	0.84	0.840	Leak Rate (cfm):	0.013	--	--	0.010		Pg:	0.6	in. WC
Md:	30.196 lb/lb-mole	Nozzle ID/Dn (in.):	7	0.215	Pump Vac (in Hg):	15	--	--	7		CO2:	12.6	%
Ms:	28.73 lb/lb-mole	No. Pts/Time (min):	12	84	Pitot Tube:	PASS	--	--	PASS		O2:	4.5	%

Sample Point	Dwell Time (min)	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in. WC)	Gas Temperatures (°F) DGM Average Amb. 60	Gas Temperatures (°F) Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Orifice Press. ΔH (in. WC) Actual	Pump Vac (in. Hg)	Gas Temps (°F) Probe Amb.	Filter Amb.	Imp. Exit Amb.	CPM Filter Amb.	Qs (acfm)	% ISO	D_{50} [10 um]	D_{50} [2.5 um]
A-1	6.63	916.250	0.51	60	590	0.38	0.40	5	243	244	66	74	0.99	102.8	9.42	2.37
2	6.69	919.100	0.52	61	591	0.38	0.39	5	244	248	61	73	0.95	97.9	9.69	2.49
3	7.13	921.870	0.59	63	591	0.38	0.39	5	248	249	58	72	0.96	92.2	9.67	2.48
4	7.19	924.840	0.60	64	592	0.38	0.39	5	240	242	57	70	0.93	88.4	9.91	2.58
5	7.01	927.740	0.57	65	591	0.38	0.39	5	243	245	57	70	0.92	90.2	9.94	2.60
6	7.13	930.560	0.59	66	590	0.38	0.40	5	243	245	57	70	0.95	91.3	9.74	2.51
B-1	6.82	933.520	0.54	67	589	0.38	0.40	5	245	250	57	71	0.96	97.1	9.61	2.45
2	6.88	936.410	0.55	68	590	0.38	0.40	5	250	250	58	73	0.98	97.9	9.50	2.41
3	7.13	939.380	0.59	69	591	0.38	0.40	5	242	244	60	74	0.96	92.6	9.64	2.47
4	7.25	942.400	0.61	70	589	0.39	0.40	5	243	246	60	74	0.96	90.5	9.67	2.48
5	7.13	945.460	0.59	71	590	0.38	0.40	5	244	245	62	76	0.96	92.9	9.62	2.46
6	7.01	948.500	0.57	72	589	0.39	0.40	5	245	246	64	78	0.95	92.7	9.74	2.51
	-	951.440				-							-	--	-	-
Final DGM:		951.440														

Actual Run Time	Vm	ΔP	Tm	Ts	Max Vac.	ΔH	% ISO		D_{50} 10 um	D_{50} 2.5 um	Yqa
84.0 min	35.190 ft^3	0.57 in. WC	66.3 °F	590.3 °F	5	0.397 in. WC	93.7		9.68	2.48	3.6

Location:	Western Refining - Gallup Refinery		Start Time:	11:45	Source:	FCCU - Condition 2	
Date:	7/12/18	Run 2	VALID	End Time:	13:20	Project No.: 2018-0742	Parameter: PM2.5/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)					+/- 50°F ΔH				VOLUME CORRECTION	
Moisture:	12.5	% est.	METER BOX:	M5-9		Ts (°F):	590	Tm (°F):	66		Ts-50°	540	Ts+50°	640	Mid 1 (cf):	
Barometric:	23.56	in. Hg	Y:	1.001				Est. Qs:	0.903	cfm	Est. Qs:	0.857	Est. Qs:	0.948	Mid 2 (cf):	
Static Press:	0.60	in. WC	ΔH@ (in. WC):	1.660				Est. μ_s:	282.77	mpoise	Est. μ_s:	272.43	Est. μ_s:	292.92	Mid 3 (cf):	
Stack Press:	23.60	in. Hg	Probe ID/Material:	PR-706-3	glass			Est. ΔH:	0.382	in. WC	Est. ΔH:	0.398	Est. ΔH:	0.402	Total (cf):	

						LEAK CHECKS				FILTER NO.	STACK DATA (FINAL)		
CO_2:	12.6	%	Pitot ID Cp/Cp':	PR-706-3	PR-706-3								
O_2:	4.5	%	Pitot Type Cp/Cp':	s-type	s-type		Pre	Mid 1	Mid 2	Post	Pb:	23.56	in. Hg
N_2/CO:	82.9	%	Pitot Cp/Cp':	0.84	0.840	Leak Rate (cfm):	0.010	--	--	0.005	Pg:	0.6	in. WC
Md:	30.20	lb/lb-mole	Nozzle ID/Dn (in.):	7	0.215	Pump Vac (in Hg):	15	--	--	5	CO2:	12.6	%
Ms:	28.67	lb/lb-mole	No. Pts/Time (min):	12	84	Pitot Tube:	PASS	--	--	PASS	O2:	4.4	%

Sample Point	Dwell Time (min)	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in. WC)	Gas Temperatures (°F) DGM Average Amb. --	Stack Amb. --	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temps (°F) Probe Amb. --	Filter Amb. --	Imp. Exit Amb. --	CPM Filter Amb. --	Qs (acfm)	% ISO	D_{50} [10 um]	D_{50} [2.5 um]
A-1	6.56	953.130	0.50	79	585	0.40	0.42	4	250	240	66	83	0.96	100.6	9.62	2.45
2	6.82	955.970	0.54	80	584	0.40	0.41	4	244	242	65	80	0.94	95.2	9.73	2.50
3	7.07	958.880	0.58	80	585	0.40	0.41	4	249	246	65	75	0.95	92.1	9.72	2.50
4	7.31	961.900	0.62	81	584	0.40	0.41	4	243	247	64	74	0.94	88.2	9.78	2.52
5	6.88	965.000	0.55	80	584	0.40	0.41	4	244	248	64	74	0.95	95.4	9.65	2.47
6	7.07	967.970	0.58	82	585	0.40	0.41	4	242	241	64	74	0.96	93.5	9.61	2.45
B-1	6.76	971.050	0.53	84	584	0.40	0.41	4	247	246	62	75	0.93	94.3	9.86	2.56
2	7.01	973.900	0.57	85	584	0.40	0.41	4	243	244	63	77	0.96	94.3	9.61	2.45
3	7.07	976.970	0.58	86	584	0.40	0.41	4	246	245	63	77	0.94	91.3	9.77	2.52
4	7.19	980.000	0.60	87	585	0.40	0.41	4	240	248	64	77	0.95	91.3	9.65	2.47
5	7.13	983.140	0.59	87	587	0.40	0.41	4	244	245	66	78	0.96	92.4	9.64	2.47
6	6.88	986.260	0.55	88	586	0.40	0.41	4	242	243	66	78	0.95	95.4	9.66	2.47
-	-	989.270				-							-	--	-	-
Final DGM:		989.270														

Actual Run Time		Vm		ΔP		Tm		Ts		Max Vac.	ΔH		% ISO		D_{50} 10 um	D_{50} 2.5 um	Yqa
83.8	min	36.140	ft^3	0.57	in. WC	83.3	°F	584.8	°F	4	0.411	in. WC	93.4		9.70	2.49	3.3

Location:	Western Refining - Gallup Refinery	Start Time:	16:45	Source:	FCCU - Condition 2
Date:	7/12/18 Run 3 VALID	End Time:	18:30	Project No.:	2018-0742 Parameter: PM2.5/CPM

STACK DATA (EST)			EQUIPMENT		
Moisture:	12.5	% est.	METER BOX:	M5-9	
Barometric:	23.56	in. Hg	Y:	1.001	
Static Press:	0.60	in. WC	ΔH@ (in. WC):	1.660	
Stack Press:	23.60	in. Hg	Probe ID/Material:	PR-706-3	glass
CO_2:	12.6	%	Pitot ID Cp/Cp':	PR-706-3	PR-706-3
O_2:	4.4	%	Pitot Type Cp/Cp':	s-type	s-type
N_2/CO:	83.0	%	Pitot Cp/Cp':	0.84	0.840
Md:	30.19	lb/lb-mole	Nozzle ID/Dn (in.):	7	0.215
Ms:	28.67	lb/lb-mole	No. Pts/Time (min):	12	84

STACK DATA (EST)					+/- 50°F ΔH				VOLUME CORRECTION
Ts (°F): 585	Tm (°F): 83		Ts-50°	535	Ts+50°	635			Mid 1 (cf):
Est. Qs:	0.898	cfm	Est. Qs:	0.852	Est. Qs:	0.943			Mid 2 (cf):
Est. μ_s:	281.65	mpoise	Est. μ_s:	271.29	Est. μ_s:	291.82			Mid 3 (cf):
Est. ΔH:	0.394	in. WC	Est. ΔH:	0.398	Est. ΔH:	0.402			Total (cf):

LEAK CHECKS	Pre	Mid 1	Mid 2	Post	FILTER NO.	STACK DATA (FINAL)		
Leak Rate (cfm):	0.016	--	--	0.008		Pb:	23.56	in. Hg
Pump Vac (in Hg):	15	--	--	5		Pg:	0.6	in. WC
Pitot Tube:	PASS	--	--	PASS		CO2:	12.6	%
						O2:	4.5	%

Sample Point	Dwell Time (min)	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in. WC)	Gas Temperatures (°F) DGM Average	Gas Temperatures (°F) Stack	Orifice Press. ΔH (in. WC) Ideal	Orifice Press. ΔH (in. WC) Actual	Pump Vac (in. Hg)	Gas Temps (°F) Probe	Gas Temps (°F) Filter	Gas Temps (°F) Imp. Exit	Gas Temps (°F) CPM Filter	Qs (acfm)	% ISO	D_{50} [10 um]	D_{50} [2.5 um]
				Amb.	Amb.				Amb.	Amb.	Amb.	Amb.				
				--	--				--	--	--	--				
A-1	6.65	990.650	0.51	74	584	0.39	0.40	3	240	242	64	72	0.99	103.1	9.39	2.36
2	6.90	993.600	0.55	74	583	0.39	0.40	3	245	241	59	71	0.96	95.8	9.62	2.45
3	7.21	996.560	0.60	73	585	0.39	0.40	3	246	240	58	71	0.96	91.7	9.63	2.46
4	7.27	999.640	0.61	73	586	0.39	0.40	3	247	244	57	71	0.95	90.5	9.66	2.47
5	6.90	1002.730	0.55	72	585	0.39	0.40	3	247	249	57	71	0.94	94.0	9.76	2.51
6	6.97	1005.620	0.56	72	586	0.39	0.40	3	245	244	57	70	0.95	94.3	9.68	2.48
B-1	6.58	1008.570	0.50	73	586	0.39	0.40	3	245	244	57	71	0.94	98.6	9.76	2.51
2	6.90	1011.330	0.55	73	585	0.39	0.40	3	243	246	57	70	0.94	94.2	9.74	2.51
3	7.15	1014.230	0.59	73	586	0.39	0.40	3	241	247	57	70	0.94	90.9	9.75	2.51
4	7.21	1017.230	0.60	73	585	0.39	0.40	3	246	246	59	70	0.94	89.6	9.79	2.53
5	7.21	1020.240	0.60	73	585	0.39	0.40	3	240	241	61	70	0.94	89.9	9.77	2.52
6	6.97	1023.260	0.56	73	586	0.39	0.40	3	244	243	61	70	0.94	93.2	9.76	2.52
-	-	1026.180				-							-	--	-	-
Final DGM:		1026.180														

Actual Run Time	Vm	ΔP	Tm	Ts	Max Vac.	ΔH	% ISO	D_{50} 10 um	D_{50} 2.5 um	Yqa
83.9 min	35.530 ft^3	0.57 in. WC	73.0 °F	585.2 °F	3	0.400 in. WC	93.5	9.70	2.49	3.6

Emission Calculations

Location Western Refining - Gallup Refinery
Source FCCU - Condition 2
Project No. 2018-0742
Parameter TSP

Run Number		Run 1	Run 2	Run 3	Average
Date		7/12/18	7/12/18	7/12/18	--
Start Time		8:10	11:45	16:45	--
Stop Time		9:45	13:13	18:30	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Coke Burn Rate, 1000 lb/hr	(FR)	5.83	5.87	5.91	5.87
Fuel Factor (CO2), dscf/MMBtu	(Fc)	1,840	1,840	1,840	1,840
Barometric Pressure, in. Hg	(Pb)	23.56	23.56	23.56	23.56
Meter Correction Factor	(Y)	0.978	0.978	0.978	0.978
Orifice Calibration Value	(ΔH @)	1.764	1.764	1.764	1.764
Meter Volume, ft^3	(Vm)	30.438	31.838	32.400	31.559
Meter Temperature, °F	(Tm)	65.4	79.4	70.4	71.8
Meter Temperature, °R	(Tm)	525.4	539.4	530.4	531.8
Meter Orifice Pressure, in. WC	(ΔH)	0.675	0.733	0.758	0.722
Volume H_2O Collected, mL	(Vlc)	67.9	71.9	84.2	74.7
Nozzle Diameter, in	(Dn)	0.230	0.230	0.230	0.230
Area of Nozzle, ft^2	(An)	0.00029	0.00029	0.00029	0.00029
Filterable PM Mass, mg	(Mn)	148.0	17.5	19.3	61.6
ISOKINETIC DATA					
Standard Meter Volume, ft^3	(Vmstd)	23.605	24.055	24.897	24.185
Standard Water Volume, ft^3	(Vwstd)	3.196	3.384	3.963	3.515
Moisture Fraction Measured	(BWSmsd)	0.119	0.123	0.137	0.127
Moisture Fraction @ Saturation	(BWSsat)	101.614	102.294	94.112	99.340
Moisture Fraction	(BWS)	0.119	0.123	0.137	0.127
Meter Pressure, in Hg	(Pm)	23.61	23.61	23.62	23.61
Volume at Nozzle, ft^3	(Vn)	66.964	68.618	71.386	68.990
Isokinetic Sampling Rate, (%)	(I)	96.2	98.3	101.3	98.6
DGM Calibration Check Value, (+/- 5%)	(Y_{qa})	-2.9	-3.8	-2.9	-3.2
EMISSION CALCULATIONS					
Filterable PM Concentration, grain/dscf	(C_s)	0.097	0.011	0.012	0.040
Filterable PM Emission Rate, lb/hr	(PMR)	23.1	2.7	2.9	2.8
Filterable PM Emission Rate, ton/yr	(ER_{FPM})	101.1	11.7	12.5	12.1
Filterable PM Emission Factor, lb/1000 lb coke burn off	(EF_{PM})	4.0	0.45	0.48	0.47

Volumetric Flow Rate Data

Location Western Refining - Gallup Refinery
Source FCCU - Condition 2
Project No. 2018-0742
Parameter TSP

Run Number		Run 1	Run 2	Run 3	Average
Date		7/12/18	7/12/18	7/12/18	--
Start Time		8:10	11:45	16:45	--
Stop Time		9:45	13:13	18:30	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		0.54	0.60	0.59	0.58
Point 2		0.57	0.59	0.61	0.59
Point 3		0.60	0.57	0.58	0.58
Point 4		0.59	0.57	0.58	0.58
Point 5		0.57	0.52	0.54	0.54
Point 6		0.57	0.52	0.53	0.54
Point 7		0.52	0.57	0.54	0.54
Point 8		0.52	0.60	0.59	0.57
Point 9		0.57	0.58	0.60	0.58
Point 10		0.60	0.58	0.61	0.60
Point 11		0.58	0.57	0.62	0.59
Point 12		0.58	0.56	0.61	0.58
CALCULATED DATA					
Square Root of ΔP, (in. WC)$^{1/2}$	(ΔP)	0.753	0.754	0.764	0.757
Pitot Tube Coefficient	(Cp)	0.84	0.84	0.84	0.84
Barometric Pressure, in. Hg	(Pb)	23.56	23.56	23.56	23.56
Static Pressure, in. WC	(Pg)	0.60	0.60	0.60	0.60
Stack Pressure, in. Hg	(Ps)	23.60	23.60	23.60	23.60
Stack Cross-sectional Area, ft^2	(As)	19.63	19.63	19.63	19.63
Temperature, °F	(Ts)	580.7	581.6	570.3	577.5
Temperature, °R	(Ts)	1040.7	1041.6	1030.3	1037.5
Moisture Fraction Measured	(BWSmsd)	0.119	0.123	0.137	0.127
Moisture Fraction @ Saturation	(BWSsat)	101.614	102.294	94.112	99.340
Moisture Fraction	(BWS)	0.119	0.123	0.137	0.127
CO_2 Concentration, %	(CO_2)	12.6	12.6	12.6	12.6
O_2 Concentration, %	(O_2)	4.5	4.4	4.5	4.5
Molecular Weight, lb/lb-mole (dry)	(Md)	30.20	30.19	30.20	30.19
Molecular Weight, lb/lb-mole (wet)	(Ms)	28.74	28.69	28.52	28.65
Velocity, ft/sec	(Vs)	67.0	67.2	67.8	67.3
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	78,913	79,139	79,907	79,320
At Standard Conditions, dscfm	(Qs)	27,819	27,745	27,871	27,812

Alliance SOURCE TESTING

Method 4 Data

Location	**Western Refining - Gallup Refinery**
Source	**FCCU - Condition 2**
Project No.	**2018-0742**
Parameter	**TSP**
Analysis	**Gravimetric**

Run 1	**Date:**	7/12/18			
Impinger No.	**1**	**2**	**3**	**4**	**Total**
Contents	H2O	H2O	Empty	Silica	--
Initial Mass, g	759.3	769.6	658.6	908.5	3096.0
Final Mass, g	805.6	781.6	660.8	915.9	3163.9
Gain	46.3	12.0	2.2	7.4	67.9
Run 2	**Date:**	7/12/18			
Impinger No.	**1**	**2**	**3**	**4**	**Total**
Contents	H2O	H2O	Empty	Silica	--
Initial Mass, g	679.3	637.4	660.0	899.0	2875.7
Final Mass, g	729.5	649.5	661.6	907.0	2947.6
Gain	50.2	12.1	1.6	8.0	71.9
Run 3	**Date:**	7/12/18			
Impinger No.	**1**	**2**	**3**	**4**	**Total**
Contents	H2O	H2O	Empty	Silica	--
Initial Mass, g	805.6	781.6	660.8	915.9	3163.9
Final Mass, g	861.5	796.1	665.1	925.4	3248.1
Gain	55.9	14.5	4.3	9.5	84.2

Alliance SOURCE TESTING

Isokinetic Field Data

Location:	Western Refining - Gallup Refinery	Start Time:	8:10	Source:	FCCU - Condition 2
Date:	7/12/18 Run 1 VALID	End Time:	9:45	Project No.:	2018-0742 Parameter: TSP

STACK DATA (EST)			EQUIPMENT		STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)			MOIST. DATA
Moisture:	12.0	% est.	Meter Box ID:	CCI-3	Est. Tm:	65	°F	9912	Pb:	23.56	in. Hg	Vlc (ml)
Barometric:	23.56	in. Hg	Y:	0.978	Est. Ts:	590	°F		Pg:	0.60	in. WC	67.9
Static Press:	0.60	in. WC	ΔH @ (in.WC):	1.764	Est. ΔP:	0.58	in. WC		CO_2:	12.6	%	K-FACTOR
Stack Press:	23.60	in. Hg	Probe ID:	PR707.3	Est. Dn:	0.268	in.		O_2:	4.5	%	1.196
CO_2:	12.6	%	Liner Material:	glass	Target Rate:	0.70	scfm					
O_2:	4.5	%	Pitot ID:	PR707-3								
N_2/CO:	82.9	%	Pitot Cp/Type:	0.84 standard								
Md:	30.20	lb/lb-mole	Nozzle ID:	sil-03								
Ms:	28.73	lb/lb-mole	Nozzle Dn (in.):	0.230								

LEAK CHECKS	Pre	Mid 1	Mid 2	Post
Leak Rate (cfm):	0.010	--	--	0.005
Vacuum (in Hg):	15	--	--	5
Pitot Tube:		--	--	

Check Pt.	Initial	Final	Corr.
Mid 1 (cf)			-
Mid 2 (cf)			-
Mid 3 (cf)			-
Mid-Point Leak Check Vol (cf):			-

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	Aux Amb.	% ISO	Vs (fps)
													-		
A-1	0.00	5.00	912.940	0.54	62	579	0.65	0.64	1	249	247	62	-	96.7	65.32
2	5.00	10.00	915.410	0.57	62	582	0.69	0.67	1	249	246	51	-	95.0	67.20
3	10.00	15.00	917.900	0.60	62	578	0.72	0.71	1	248	246	51	-	98.4	68.82
4	15.00	20.00	920.550	0.59	64	577	0.72	0.70	1	249	246	50	-	94.5	68.21
5	20.00	25.00	923.085	0.57	64	585	0.69	0.68	1	251	250	52	-	96.9	67.30
6	25.00	30.00	925.630	0.57	65	586	0.69	0.68	1	248	246	53	-	96.5	67.33
B-1	30.00	35.00	928.170	0.52	66	570	0.64	0.62	1	245	251	55	-	96.2	63.82
2	35.00	40.00	930.610	0.52	67	575	0.64	0.62	1	248	249	57	-	96.2	63.97
3	40.00	45.00	933.050	0.57	67	580	0.69	0.68	1	249	252	60	-	95.5	67.14
4	45.00	50.00	935.580	0.60	68	578	0.73	0.72	1	250	248	60	-	96.2	68.82
5	50.00	55.00	938.200	0.58	69	585	0.70	0.69	1	247	250	60	-	97.2	67.89
6	55.00	60.00	940.800	0.58	69	593	0.70	0.69	1	247	251	60	-	96.7	68.15
	60.00	--	943.378										-		-

Final DGM: 943.378

RESULTS	Run Time	Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y_{qa}
	60.0 min	30.438 ft^3	0.57 in. WC	65.4 °F	580.7 °F	1	0.675 in. WC	96.2	0.119	-2.9

Alliance SOURCE TESTING

Isokinetic Field Data

Location:	Western Refining - Gallup Refinery	Start Time:	11:45	Source:	FCCU - Condition 2
Date:	7/12/18 Run 2 VALID	End Time:	13:13	Project No.:	2018-0742 Parameter: TSP

STACK DATA (EST)			EQUIPMENT		STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)			MOIST. DATA
Moisture:	12.0	% est.	Meter Box ID:	CCI-3	Est. Tm:	65	°F		Pb:	23.56	in. Hg	Vlc (ml)
Barometric:	23.56	in. Hg	Y:	0.978	Est. Ts:	581	°F		Pg:	0.60	in. WC	71.9
Static Press:	0.60	in. WC	ΔH @ (in.WC):	1.764	Est. ΔP:	0.57	in. WC		CO_2:	12.6	%	K FACTOR
Stack Press:	23.60	in. Hg	Probe ID:	PR707-3	Est. Dn:	0.269	in.		O_2:	4.4	%	1.21
CO_2:	12.6	%	Liner Material:	glass	Target Rate:	0.70	scfm					
O_2:	4.5	%	Pitot ID:	PR707-3								
N_2/CO:	82.9	%	Pitot Cp/Type:	0.84 standard								
Md:	30.20	lb/lb-mole	Nozzle ID:	sil-03								
Ms:	28.73	lb/lb-mole	Nozzle Dn (in.):	0.230								

LEAK CHECKS	Pre	Mid 1	Mid 2	Post
Leak Rate (cfm):	0.002	--	--	0.000
Vacuum (in Hg):	17	--	--	6
Pitot Tube:		--	--	

Check Pt.	Initial	Final	Corr.
Mid 1 (cf)			-
Mid 2 (cf)			-
Mid 3 (cf)			-
Mid-Point Leak Check Vol (cf):			-

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	Aux		
					Amb.	Amb.				Amb.	Amb.	Amb.	Amb.		
	Begin	End			---	--	Ideal	Actual		--	--	--	--		
A-1	0.00	5.00	951.550	0.60	77	578	0.74	0.75	1	252	249	63	-	100.0	68.82
2	5.00	10.00	954.320	0.59	77	581	0.73	0.73	1	250	251	60	-	94.4	68.34
3	10.00	15.00	956.910	0.57	77	575	0.71	0.71	1	251	252	60	-	97.6	66.98
4	15.00	20.00	959.550	0.57	78	578	0.71	0.71	1	245	234	60	-	97.2	67.07
5	20.00	25.00	962.180	0.52	78	588	0.64	0.64	1	244	250	59	-	97.9	64.37
6	25.00	30.00	964.700	0.52	78	584	0.64	0.70	1	246	252	59		100.5	64.25
B-1	30.00	35.00	967.290	0.57	79	581	0.71	0.70	1	245	244	60	-	100.1	67.17
2	35.00	40.00	970.000	0.60	80	579	0.75	0.70	1	251	245	62	-	93.3	68.85
3	40.00	45.00	972.600	0.58	81	577	0.73	0.75	1	251	251	63	-	96.3	67.63
4	45.00	50.00	975.245	0.58	82	577	0.73	0.80	1	250	248	65	-	97.6	67.63
5	50.00	55.00	977.930	0.57	83	589	0.71	0.80	1	248	255	65	-	94.6	67.43
6	55.00	60.00	980.500	0.56	83	592	0.69	0.80	1	246	240	65	-	107.4	66.93
--	60.00	--	983.388										-		-
	Final DGM:		983.388												

RESULTS

Run Time	Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y_{qa}
60.0 min	31.838 ft^3	0.57 in. WC	79.4 °F	581.6 °F	1	0.733 in. WC	98.3	0.123	-3.8

Isokinetic Field Data

Location:	Western Refining - Gallup Refinery		Start Time:	16:45	Source:	FCCU - Condition 2	
Date:	7/12/18	Run 3	VALID	End Time:	18:30	Project No.:	2018-0742	Parameter: TSP

STACK DATA (EST)			EQUIPMENT		STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)			MOIST. DATA
Moisture:	12.0	% est.	Meter Box ID:	CCI-3	Est. Tm:	79	°F		Pb:	23.56	in. Hg	Vlc (ml)
Barometric:	23.56	in. Hg	Y:	0.978	Est. Ts:	582	°F		Pg:	0.60	in. WC	84.2
Static Press:	0.60	in. WC	ΔH @ (in.WC):	1.764	Est. ΔP:	0.57	in. WC		CO_2:	12.6	%	K FACTOR
Stack Press:	23.60	in. Hg	Probe ID:	PR707-3	Est. Dn:	0.265	in.		O_2:	4.5	%	1.239
CO_2:	12.6	%	Liner Material:	glass	Target Rate:	0.70	scfm					

O_2: 4.5 %	Pitot ID: PR707-3	LEAK CHECKS	Pre	Mid 1	Mid 2	Post	Check Pt.	Initial	Final	Corr.
N_2/CO: 82.9 %	Pitot Cp/Type: 0.84 standard	Leak Rate (cfm):	0.005	--	--	0.000	Mid 1 (cf)			-
Md: 30.20 lb/lb-mole	Nozzle ID: sil-03	Vacuum (in Hg):	12	--	--	4	Mid 2 (cf)			-
Ms: 28.73 lb/lb-mole	Nozzle Dn (in.): 0.230	Pitot Tube:		--	--		Mid 3 (cf)			-
							Mid-Point Leak Check Vol (cf):			-

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average (Amb. ---)	Stack (Amb. --)	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe (Amb. --)	Filter (Amb. --)	Imp Exit (Amb. --)	Aux (Amb. --)	% ISO	Vs (fps)
A-1	0.00	5.00	983.630	0.59	71	575	0.73	0.74	1	226	207	62	-	101.4	68.14
2	5.00	10.00	986.390	0.61	71	577	0.75	0.75	1	244	243	53	-	97.0	69.35
3	10.00	15.00	989.070	0.58	71	578	0.71	0.80	1	244	241	52	-	97.6	67.66
4	15.00	20.00	991.700	0.58	70	578	0.71	0.80	1	246	248	51	-	106.0	67.66
5	20.00	25.00	994.550	0.54	70	571	0.67	0.70	1	249	245	52	-	100.8	65.06
6	25.00	30.00	997.175	0.53	70	570	0.65	0.70	1	248	249	54	-	99.8	64.43
B-1	30.00	35.00	999.750	0.54	70	567	0.67	0.70	1	249	250	55	-	99.7	64.94
2	35.00	40.00	1002.350	0.59	70	566	0.73	0.70	1	249	249	57	-	92.4	67.84
3	40.00	45.00	1004.870	0.60	70	565	0.74	0.80	1	249	249	58	-	99.9	68.38
4	45.00	50.00	1007.620	0.61	70	565	0.76	0.80	1	249	250	58	-	99.8	68.95
5	50.00	55.00	1010.390	0.62	71	565	0.77	0.80	1	250	246	59	-	99.2	69.51
6	55.00	60.00	1013.170	0.61	71	566	0.76	0.80	1	249	251	60	-	102.9	68.98
--	60.00	--	1016.030										-		-
	Final DGM:		1016.030												

RESULTS	Run Time	Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y_{qa}
	60.0 min	32.400 ft^3	0.58 in. WC	70.4 °F	570.3 °F	1	0.758 in. WC	101.3	0.137	-2.9

ESP Power Consumption During Stack Test

1-minute average	FCJI810A.PV AVC1, PRI CURRENT AMPERS	FCJI810V.PV AVC1, PRI JVOLTAGE VOLTS	FCJI811A.PV AVC2, PRI CURRENT AMPERS	FCJI811V.PV AVC2, PRI JVOLTAGE VOLTS	FCJI812A.PV AVC3, PRI CURRENT AMPERS	FCJI812V.PV AVC3, PRI JVOLTAGE VOLTS	FCJI813A.PV AVC4, PRI CURRENT AMPERS	FCJI813V.PV AVC4, PRI JVOLTAGE VOLTS	FCJI814A.PV AVC5, PRI CURRENT AMPERS	FCJI814V.PV AVC5, PRI JVOLTAGE VOLTS
Start Time										
10-Jul-18 16:00:00	157.9758759	142.5479902	158.9712067	130.4616255	158.9712067	124.9872131	155.9851685	125.9825439	0	0
10-Jul-18 16:01:00	146.4585051	137.0025695	158.9712067	130.4616069	158.9712067	124.9872131	155.9851685	125.9825439	0	0
10-Jul-18 16:02:00	139.9884202	134.5140497	158.9712067	130.4616261	158.9712067	124.9872131	155.9851685	125.9825439	0	0
10-Jul-18 16:03:00	138.9932885	134.5141486	158.9712067	129.9639435	158.9712067	124.4895421	155.9851685	125.9825439	0	0
10-Jul-18 16:04:00	138.4953731	134.5140412	158.9712067	130.4616053	158.9712067	124.4895212	155.9851685	125.9825439	0	0
10-Jul-18 16:05:00	145.5339807	138.0688829	158.9712067	130.9592896	158.9712067	124.9872131	155.9851685	126.4802117	0	0
10-Jul-18 16:06:00	152.5013152	141.0549029	158.9712067	131.4569497	158.9712067	124.4895454	155.9851685	126.9779053	0	0
10-Jul-18 16:07:00	157.9758759	143.0456543	158.9712067	130.4616552	158.9712067	123.9918518	155.9851685	126.9779053	0	0
10-Jul-18 16:08:00	157.9758759	143.0456543	158.9712067	129.4662616	158.9712067	124.4895236	155.9851685	125.9825769	0	0
10-Jul-18 16:09:00	157.9758759	143.0456543	158.9712067	130.4616117	158.9712067	124.9872131	155.9851685	125.4848737	0	0
10-Jul-18 16:10:00	157.9758759	143.0456543	158.9712067	130.4616213	158.9712067	124.9872131	155.9851685	125.9825439	0	0
10-Jul-18 16:11:00	142.9747086	136.0071939	158.9712067	129.9639435	158.9712067	124.4895373	155.9851685	125.9825439	0	0
10-Jul-18 16:12:00	142.9744224	136.0070596	158.9712067	130.9592802	158.9712067	124.4895278	155.9851685	126.4802199	0	0
10-Jul-18 16:13:00	152.0038677	140.5573208	158.9712067	130.9593022	158.9712067	124.9872131	155.9851685	126.4802309	0	0
10-Jul-18 16:14:00	150.5106922	140.0595837	158.9712067	130.4616084	158.9712067	125.4848704	155.9851685	125.9825439	0	0
10-Jul-18 16:15:00	143.9701423	137.0025785	158.9712067	130.9592896	158.9712067	124.9872189	155.9851685	126.4802141	0	0
10-Jul-18 16:16:00	145.4626118	137.5000011	158.9712067	130.4616294	158.9712067	124.4895196	155.9851685	126.4802375	0	0
10-Jul-18 16:17:00	146.4585812	137.0026287	158.9712067	130.4616036	158.9712067	124.9872131	155.9851685	126.4802117	0	0
10-Jul-18 16:18:00	131.9547207	130.9592896	158.9712067	130.9592896	158.9712067	124.9872131	155.9851685	126.9779053	0	0
10-Jul-18 16:19:00	143.4718604	136.504655	158.9712067	131.4569497	158.9712067	124.9872131	155.9851685	126.9779053	0	0
10-Jul-18 16:20:00	150.0132986	138.4955909	158.9712067	131.4569755	158.9712067	124.4895454	155.9851685	126.4802375	0	0
10-Jul-18 16:21:00	150.0128855	138.9930666	158.9712067	130.9592896	158.9712067	123.9918518	155.9851685	126.4802117	0	0
10-Jul-18 16:22:00	157.9758759	143.0456543	158.9712067	131.4569497	158.9712067	124.4895196	155.9851685	126.4802375	0	0
10-Jul-18 16:23:00	155.4875385	142.0503224	158.9712067	131.4569697	158.9712067	124.4895396	155.9851685	125.9825439	0	0
10-Jul-18 16:24:00	155.4874967	141.5526339	158.9712067	130.9592896	158.9712067	124.4895312	155.9851685	126.4802233	0	0
10-Jul-18 16:25:00	150.5107841	138.9931718	158.9712067	130.4616178	158.9712067	124.9872131	155.9851685	126.4802259	0	0
10-Jul-18 16:26:00	150.5107461	138.9931563	158.9712067	129.9639435	158.9712067	124.9872131	155.9851685	125.9825439	0	0
10-Jul-18 16:27:00	156.9805247	142.0503082	158.9712067	130.4616153	158.9712067	124.9872131	155.9851685	125.9825439	0	0
10-Jul-18 16:28:00	152.5014584	140.5572853	158.4735425	130.4616178	158.9712067	124.4895337	155.9851685	125.9825439	0	0
10-Jul-18 16:29:00	147.0270436	138.5665906	158.47354	130.4616153	158.9712067	124.4895312	155.9851685	125.9825439	0	0
10-Jul-18 16:30:00	151.5060486	140.5572651	158.9712067	130.9592896	158.9712067	124.4895373	155.9851685	125.9825439	0	0
10-Jul-18 16:31:00	142.4771507	136.5049087	158.9712067	130.4616249	158.9712067	124.4895241	155.9851685	126.4802163	0	0
10-Jul-18 16:32:00	134.5139803	132.9499316	158.9712067	129.9639435	158.9712067	124.9872131	155.9851685	126.9779053	0	0
10-Jul-18 16:33:00	150.0129584	138.9931127	158.9712067	130.4616082	158.9712067	124.4895408	155.9851685	126.480233	0	0
10-Jul-18 16:34:00	142.9748917	135.5095959	158.9712067	130.4616274	158.9712067	124.4895216	155.9851685	125.9825439	0	0
10-Jul-18 16:35:00	142.9741592	136.0069361	158.9712067	129.9639435	158.9712067	124.9872131	155.9851685	126.4802112	0	0
10-Jul-18 16:36:00	144.9656065	137.0026348	158.9712067	130.4616031	158.9712067	124.9872131	155.9851685	126.480238	0	0
10-Jul-18 16:37:00	144.964905	137.002309	158.9712067	130.4616299	158.9712067	124.9872131	155.4875088	125.9825439	0	0
10-Jul-18 16:38:00	158.4735329	143.0456543	158.9712067	130.4616082	158.9712067	124.9872131	155.4874871	125.9825439	0	0
10-Jul-18 16:39:00	150.0131436	139.4908606	158.9712067	130.4616198	158.9712067	124.9872131	155.9851685	125.9825439	0	0
10-Jul-18 16:40:00	149.5153631	139.4908136	158.9712067	130.959283	158.9712067	124.4895358	155.9851685	125.9825439	0	0
10-Jul-18 16:41:00	157.9758759	142.5479846	158.9712067	131.4569659	158.9712067	124.4895292	155.9851685	125.9825439	0	0
10-Jul-18 16:42:00	157.9758759	142.547978	158.9712067	130.4616198	158.9712067	124.4895358	155.9851685	125.9825439	0	0
10-Jul-18 16:43:00	149.5155459	139.4908904	158.9712067	130.461609	158.9712067	123.9918518	155.9851685	126.4802171	0	0
10-Jul-18 16:44:00	137.5002281	133.9453743	158.9712067	130.4616282	158.9712067	123.9918518	155.9851685	126.4802363	0	0
10-Jul-18 16:45:00	146.4580158	137.0023705	158.9712067	129.9639435	158.9712067	124.9871779	155.9851685	125.9825439	0	0
10-Jul-18 16:46:00	158.4735496	142.0503082	158.9712067	129.4662788	158.9712067	125.4848869	155.9851685	125.4848869	0	0
10-Jul-18 16:47:00	157.9758759	142.0503082	158.9712067	129.9639268	158.9712067	124.9872131	155.9851685	125.4848702	0	0
10-Jul-18 16:48:00	158.4735329	142.0503082	158.9712067	130.4616249	158.9712067	124.9872131	155.9851685	125.9825439	0	0
10-Jul-18 16:49:00	158.473553	142.0503082	158.9712067	129.9639435	158.9712067	124.9872131	155.9851685	126.4802128	0	0
10-Jul-18 16:50:00	141.4820437	135.5096508	158.9712067	130.4616015	158.9712067	125.4848635	155.9851685	126.4802397	0	0
10-Jul-18 16:51:00	142.2618999	135.6182708	158.9712067	130.9592896	158.9712067	125.4765991	155.9851685	126.4883664	0	0
10-Jul-18 16:52:00	158.9712067	142.0503082	158.9712067	130.9594275	158.9712067	124.9872131	155.9851685	126.4637882	0	0
10-Jul-18 16:53:00	158.9712067	142.0503082	158.9712067	131.4732663	158.9712067	124.9872131	155.9851685	125.9826799	0	0
10-Jul-18 16:54:00	158.9712067	142.5479777	158.9712067	131.4405152	158.9712067	124.9872131	155.9850325	126.4883798	0	0
10-Jul-18 16:55:00	158.4735447	142.5479847	158.9712067	130.9592896	158.9712067	125.4848751	155.4793402	126.9779053	0	0
10-Jul-18 16:56:00	141.9793157	135.5094961	158.9712067	130.4616198	158.9712067	125.9825439	155.4874921	126.4802279	0	0
10-Jul-18 16:57:00	121.0058465	126.9779184	158.9712067	129.9639435	158.9712067	125.4848818	155.9851685	125.9825439	0	0
10-Jul-18 16:58:00	122.0010974	127.4755492	158.9712067	130.4616107	158.9712067	124.4895383	155.9851685	125.9825439	0	0
10-Jul-18 16:59:00	142.9743118	136.0070244	158.9712067	130.9592896	158.9712067	124.4895241	155.9851685	125.9825439	0	0
10-Jul-18 17:00:00	144.9654708	137.0025554	158.9712067	130.9592896	158.9712067	124.9872131	155.9851685	126.4802164	0	0
10-Jul-18 17:01:00	144.965044	137.5000547	158.9712067	130.9592896	158.9712067	124.9872131	155.9851685	126.4802327	0	0
10-Jul-18 17:02:00	157.9758759	143.0456543	158.9712067	130.9592896	158.9712067	124.9872131	155.9851685	126.4802165	0	0
10-Jul-18 17:03:00	148.0225619	138.9932377	158.9712067	130.4616246	158.9712067	124.9872131	155.9851685	126.4802327	0	0
10-Jul-18 17:04:00	142.5478856	136.5047731	158.9712067	130.4616059	158.9712067	124.9872131	155.9851685	126.480214	0	0
10-Jul-18 17:05:00	149.0176781	139.0642437	158.9712067	130.4616297	158.9712067	124.4895456	155.9851685	126.9779053	0	0
10-Jul-18 17:06:00	154.4920572	141.0549358	158.9712067	129.9639435	158.9712067	124.4895193	155.9851685	126.4802378	0	0
10-Jul-18 17:07:00	158.4735282	143.0456282	158.9712067	130.4616035	158.9712067	125.4848655	155.9851685	126.4802116	0	0
10-Jul-18 17:08:00	158.4735501	143.045672	158.9712067	130.9592896	158.9712067	125.4848874	155.9851685	126.9779053	0	0
10-Jul-18 17:09:00	157.9758759	142.5479765	158.9712067	130.9592896	158.9712067	124.9872131	155.9851685	126.4802294	0	0
10-Jul-18 17:10:00	152.0038495	140.5573132	158.9712067	130.4616213	158.9712067	125.4848737	155.9851685	126.4802198	0	0
10-Jul-18 17:11:00	152.0037341	140.0595969	158.4735461	130.4616117	158.9712067	125.4848833	155.9851685	126.4802294	0	0
10-Jul-18 17:12:00	158.4735365	142.0503082	157.9758759	130.9592896	158.9712067	124.9872131	155.9851685	125.9825439	0	0
10-Jul-18 17:13:00	158.9712067	142.547974	158.473534	130.9592896	158.9712067	124.9872131	155.9851685	126.4802174	0	0
10-Jul-18 17:14:00	158.4735509	142.5479909	158.9712067	130.9592896	158.9712067	124.9872131	155.9851685	126.4802342	0	0
10-Jul-18 17:15:00	158.4735324	142.0503082	158.9712067	130.9592896	158.9712067	124.9872131	155.9851685	126.4802157	0	0
10-Jul-18 17:16:00	158.4735494	142.5479732	158.9712067	131.4569545	158.9712067	125.4848704	155.9851685	126.9779053	0	0
10-Jul-18 17:17:00	149.5155567	138.9932376	158.9712067	130.9593058	158.9712067	124.9872141	155.9851685	126.4802327	0	0
10-Jul-18 17:18:00	149.5152813	138.9931057	158.9712067	129.9639435	158.9712067	124.4895244	155.9851685	126.4802165	0	0
10-Jul-18 17:19:00	145.9607363	137.0025395	158.9712067	130.4616109	158.9712067	125.484873	155.9851685	126.9779053	0	0
10-Jul-18 17:20:00	137.9977933	134.0164074	158.9712067	130.4616196	158.9712067	125.9825439	155.9851685	126.4802276	0	0
10-Jul-18 17:21:00	150.0130434	139.5619202	158.9712067	130.4616135	158.9712067	125.4848816	155.9851685	126.4802216	0	0
10-Jul-18 17:22:00	157.9758759	142.5479782	158.9712067	130.9592896	158.9712067	124.9872131	155.9851685	126.4802276	0	0
10-Jul-18 17:23:00	158.4735349	143.0456543	158.9712067	130.4616228	158.9712067	125.4848722	155.9851685	125.9825439	0	0
10-Jul-18 17:24:00	148.0225963	138.495579	158.9712067	130.4616069	158.9712067	125.4848882	155.9851685	125.9825439	0	0
10-Jul-18 17:25:00	147.5245172	138.4954031	158.9712067	130.9592896	158.9712067	125.4848689	155.487505	125.9825439	0	0
10-Jul-18 17:26:00	158.4735316	143.5433177	158.9712067	130.4616261	158.9712067	125.4848882	155.4874858	126.480215	0	0
10-Jul-18 17:27:00	143.970192	137.002608	158.9712067	129.9639435	158.9712067	125.4848689	155.9851685	126.9779053	0	0
10-Jul-18 17:28:00	143.4719563	136.0070091	158.9712067	130.4616069	158.9712067	125.4848882	155.9851685	126.4802342	0	0
10-Jul-18 17:29:00	157.9758759	142.0503082	158.9712067	130.9592896	158.9712067	124.9872131	155.9851685	125.9825439	0	0
10-Jul-18 17:30:00	146.9561469	137.5002347	158.9712067	130.4616255	158.9712067	124.9872131	155.9851685	126.4802156	0	0
11-Jul-18 09:30:00	143.0455392	138.5665525	158.9712067	132.4523286	158.9712067	125.9825439	154.9898224	127.4755906	0	0
11-Jul-18 09:31:00	152.9990417	142.5479332	158.9712067	132.9499625	158.9712067	126.9778784	154.9898224	127.9732321	0	0
11-Jul-18 09:32:00	157.9758759	144.538683	158.9712067	132.4523375	158.9712067	126.9779169	154.9898224	127.9732706	0	0
11-Jul-18 09:33:00	157.9758759	144.0410004	158.9712067	131.456953	158.9712067	125.9825439	154.9898224	126.9779053	0	0
11-Jul-18 09:34:00	152.9992594	142.0503568	158.9712067	131.9546356	158.9712067	125.9825439	154.9898224	126.9779053	0	0
11-Jul-18 09:35:00	133.5191885	133.0212877	158.9712067	131.9546356	158.9712067	125.4848932	154.9898224	126.9779053	0	0
11-Jul-18 09:36:00	135.0113003	133.0208724	158.9712067	131.9546356	158.9712067	125.4848639	154.9898224	126.9779053	0	0
11-Jul-18 09:37:00	140.9841519	136.0072454	158.9712067	131.4569773	158.9712067	125.4848932	154.9898224	127.4755636	0	0
11-Jul-18 09:38:00	142.4766603	137.0023744	158.9712067	131.954624	158.9712067	125.4848689	154.9898224	127.4755879	0	0
11-Jul-18 09:39:00	154.4921448	142.5479767	158.4735458	131.9546524	158.9712067	125.9825439	154.9898224	126.9779053	0	0
11-Jul-18 09:40:00	141.979329	137.0025273	158.4735367	130.9592896	158.9712067	125.9825439	154.9898224	126.9779053	0	0
11-Jul-18 09:41:00	141.4814223	137.0024166	158.9712067	131.456958	158.9712067	125.9825439	154.9898224	126.9779053	0	0
11-Jul-18 09:42:00	154.9898133	143.0456543	158.9712067	131.9546356	158.9712067	125.9825439	154.9898224	126.9779053	0	0
11-Jul-18 09:43:00	154.9898366	143.0456543	158.9712067	132.4523092	158.9712067	126.4802175	154.9898224	126.9779053	0	0

11-Jul-18 09:44:00	149.5154979	141.054993	158.9712067	132.9499969	158.9712067	125.9825784	154.9898224	126.9779053	0	0
11-Jul-18 09:45:00	151.505996	141.5525833	158.9712067	132.9499969	158.9712067	125.4848697	154.9898224	127.4755694	0	0
11-Jul-18 09:46:00	146.4584699	138.9932462	158.9712067	132.4523244	158.9712067	125.9825439	154.9898224	127.4755864	0	0
11-Jul-18 09:47:00	125.982705	129.9640007	158.9712067	131.4569707	158.9712067	125.9825439	154.9898224	126.9779053	0	0
11-Jul-18 09:48:00	128.5418352	131.527963	158.9712067	131.4569545	158.9712067	126.4802165	154.9898224	127.4755702	0	0
11-Jul-18 09:49:00	137.5002066	135.5094782	158.9712067	131.9546356	158.9712067	126.4802351	154.9898224	127.9732513	0	0
11-Jul-18 09:50:00	130.9594005	132.4523474	158.9712067	131.9546356	158.9712067	125.9825439	154.9898224	127.4755912	0	0
11-Jul-18 09:51:00	132.5232708	133.4475902	158.9712067	131.9546356	158.9712067	126.4802117	154.9898224	126.9779053	0	0
11-Jul-18 09:52:00	142.0502126	137.5000968	158.9712067	131.9546356	158.9712067	126.4802375	154.9898224	127.4755654	0	0
11-Jul-18 09:53:00	129.5376952	131.5281989	158.9712067	131.9546356	158.9712067	125.9825439	154.9898224	127.4755879	0	0
11-Jul-18 09:54:00	135.5091748	134.0162986	158.9712067	131.9546356	158.9712067	125.9825439	154.9898224	127.475572	0	0
11-Jul-18 09:55:00	152.5015268	142.0503335	158.9712067	131.9546356	158.9712067	126.4802183	154.9898224	127.4755846	0	0
11-Jul-18 09:56:00	141.4815998	137.5001851	158.9712067	132.45231	158.9712067	126.9779053	154.9898224	127.475572	0	0
11-Jul-18 09:57:00	136.504784	135.4383482	158.9712067	132.4523226	158.9712067	126.4802309	154.9898224	127.4755846	0	0
11-Jul-18 09:58:00	147.5245518	139.9884452	158.9712067	132.4523083	158.9712067	125.9825439	154.9898224	127.4755703	0	0
11-Jul-18 09:59:00	147.5249212	139.4909327	158.9712067	132.9499969	158.9712067	126.480215	154.9898224	127.9732513	0	0
11-Jul-18 10:00:00	136.0071467	134.4430182	158.9712067	132.452326	158.9712067	126.4802344	154.9898224	127.4755881	0	0
11-Jul-18 10:01:00	137.002431	135.5094142	158.9712067	131.9546356	158.9712067	126.4802147	154.9898224	127.9732316	0	0
11-Jul-18 10:02:00	136.504842	135.5094762	158.9712067	131.9546356	158.9712067	126.4802345	154.9898224	128.4709342	0	0
11-Jul-18 10:03:00	125.4850464	129.4663593	158.9712067	131.4569725	158.9712067	125.9825439	154.9898224	127.9732513	0	0
11-Jul-18 10:04:00	122.0011091	127.4755492	158.9712067	131.4569568	158.9712067	125.4848844	154.9898224	127.4755841	0	0
11-Jul-18 10:05:00	142.4768393	136.5047773	158.9712067	131.9546356	158.9712067	125.4848769	154.9898224	126.9779053	0	0
11-Jul-18 10:06:00	157.9758759	143.5433258	158.9712067	131.9546356	158.9712067	125.9825439	154.9898224	126.9779053	0	0
11-Jul-18 10:07:00	154.49216	143.0456573	158.9712067	131.9546356	158.9712067	125.9825439	154.9898224	126.9779053	0	0
11-Jul-18 10:08:00	141.4815922	137.0025053	158.9712067	131.4569659	158.9712067	125.9825439	154.9898224	126.9779053	0	0
11-Jul-18 10:09:00	132.9499716	132.9499716	158.4735463	131.4569575	158.9712067	125.9825439	154.9898224	126.9779053	0	0
11-Jul-18 10:10:00	126.9779667	130.4616511	158.4735363	131.4569675	158.9712067	126.4802197	154.9898224	126.9779053	0	0
11-Jul-18 10:11:00	123.991821	128.9685782	158.9712067	131.4569578	158.9712067	125.9825688	154.9898224	127.4755735	0	0
11-Jul-18 10:12:00	125.9825708	130.4616213	158.9712067	131.9546356	158.9712067	125.4848737	154.9898224	127.4755831	0	0
11-Jul-18 10:13:00	132.5232811	133.5187006	158.9712067	131.9546356	158.9712067	125.9825439	154.9898224	126.9779053	0	0
11-Jul-18 10:14:00	147.5245909	139.5618861	158.9712067	132.4523064	158.9712067	126.4802147	154.9898224	126.9779053	0	0
11-Jul-18 10:15:00	152.999148	142.0503082	158.9712067	132.4523251	158.9712067	126.4802335	154.9898224	126.9779053	0	0
11-Jul-18 10:16:00	149.0177931	140.557305	158.9712067	131.4569704	158.9712067	125.9825439	154.9898224	127.4755705	0	0
11-Jul-18 10:17:00	136.5049567	134.5141709	158.9712067	131.4569547	158.9712067	125.9825439	154.9898224	127.9732513	0	0
11-Jul-18 10:18:00	131.456892	132.452277	158.9712067	131.9546356	158.9712067	125.9825439	154.9898224	127.4755862	0	0
11-Jul-18 10:19:00	143.4720642	137.9977619	158.9712067	131.9546356	158.9712067	125.9825439	154.9898224	126.9779053	0	0
11-Jul-18 10:20:00	146.0318216	139.064314	158.4735542	131.9546356	158.9712067	125.9825439	154.9898224	126.9779053	0	0
11-Jul-18 10:21:00	143.0456027	137.5712304	158.4735284	131.9546356	158.9712067	125.9825439	154.9898224	127.4755654	0	0
11-Jul-18 10:22:00	147.0269869	139.5619043	158.9712067	132.4523034	158.9712067	125.4848914	154.9898224	127.9732513	0	0
11-Jul-18 10:23:00	137.9980114	136.0072144	158.9712067	132.452325	158.9712067	125.4848698	154.9898224	127.9732513	0	0
11-Jul-18 10:24:00	133.0210247	133.4476319	158.9712067	131.9546356	158.9712067	125.9825439	154.9898224	126.9779068	0	0
11-Jul-18 10:25:00	143.0456102	137.500123	158.9712067	132.4523117	158.9712067	125.9825439	154.9898224	126.4802201	0	0
11-Jul-18 10:26:00	144.0410277	138.5665939	158.9712067	132.4523208	158.9712067	125.9825439	154.9898224	126.9779053	0	0
11-Jul-18 10:27:00	143.0456361	138.5665848	158.9712067	131.9546356	158.9712067	125.9825439	154.9898224	127.4755738	0	0
11-Jul-18 10:28:00	134.5142302	134.016489	158.9712067	131.9546356	158.9712067	125.9825439	154.9898224	127.9732513	0	0
11-Jul-18 10:29:00	136.0069364	134.5140193	158.9712067	132.4523084	158.9712067	125.9825439	154.9898224	127.9732513	0	0
11-Jul-18 10:30:00	144.0410708	137.9978505	158.9712067	132.9499969	158.9712067	125.9825439	154.9898224	126.9779133	0	0
11-Jul-18 10:31:00	138.5666129	136.5047823	158.9712067	132.9499969	158.9712067	126.4802168	154.9898224	126.977882	0	0
11-Jul-18 10:32:00	139.064231	137.0735626	158.9712067	132.4523241	158.9712067	126.4802325	154.9898224	127.4755862	0	0
11-Jul-18 10:33:00	149.5152856	140.5572266	158.9712067	131.9546356	158.9712067	125.4848864	154.9898224	126.9779053	0	0
11-Jul-18 10:34:00	157.9758759	143.5433377	158.9712067	131.9546356	158.9712067	125.4848682	154.9898224	126.9779053	0	0
11-Jul-18 10:35:00	157.9758759	143.0456543	158.9712067	131.4569755	158.9712067	125.4848914	154.9898224	126.4802375	0	0
11-Jul-18 10:36:00	157.9758759	143.5433144	158.9712067	131.4569497	158.9712067	125.4848656	154.9898224	125.9825439	0	0
11-Jul-18 10:37:00	143.4726129	137.0026545	158.9712067	131.9546356	158.9712067	125.9825439	154.9898224	126.4802117	0	0
11-Jul-18 10:38:00	135.5093264	134.0163554	158.9712067	131.9546356	158.9712067	125.9825439	154.9898224	127.4755687	0	0
11-Jul-18 10:39:00	140.0596414	137.0024855	158.9712067	131.9546356	158.9712067	125.9825439	154.9898224	127.4755846	0	0
11-Jul-18 10:40:00	146.5292656	138.9931252	158.9712067	131.9546356	158.9712067	125.9825439	154.9898224	126.9779053	0	0
11-Jul-18 10:41:00	156.4828305	143.0456419	158.9712067	132.4523101	158.9712067	125.9825439	154.9898224	127.4755721	0	0
11-Jul-18 10:42:00	156.4828673	143.5433334	158.9712067	132.4523224	158.9712067	126.4802185	154.9898224	127.4755844	0	0
11-Jul-18 10:43:00	151.5061776	141.5526637	158.9712067	132.4523068	158.9712067	126.4802341	154.9898224	127.4755688	0	0
11-Jul-18 10:44:00	135.509785	134.5142506	158.9712067	132.4523292	158.9712067	125.9825439	154.9898224	127.4755912	0	0
11-Jul-18 10:45:00	140.4858559	136.5046513	158.9712067	131.4569723	158.9712067	125.9825439	154.9898224	126.4802344	0	0
11-Jul-18 10:46:00	153.4968625	142.548001	158.9712067	131.9546301	158.9712067	125.9825439	154.9898224	126.480218	0	0
11-Jul-18 10:47:00	138.9932966	136.0071926	158.9712067	132.9499969	158.9712067	125.4848851	154.9898224	127.4755717	0	0
11-Jul-18 10:48:00	143.4720448	137.5000585	158.9712067	132.4523229	158.9712067	125.484872	154.9898224	127.9732513	0	0
11-Jul-18 10:49:00	141.9795272	137.0026115	158.9712067	132.4523064	158.4735511	125.4848884	154.9898224	127.4755882	0	0
11-Jul-18 10:50:00	140.4857996	136.5046259	158.9712067	132.4523294	158.4735281	125.4848654	154.9898224	126.9779053	0	0
11-Jul-18 10:51:00	142.4772139	137.5002916	158.9712067	132.4523031	158.9712067	125.9825439	154.9898224	127.4755651	0	0
11-Jul-18 10:52:00	138.9929329	136.0070187	158.9712067	132.4523294	158.9712067	126.4802114	154.9898224	126.977924	0	0
11-Jul-18 10:53:00	144.5387439	139.064288	158.4735502	131.4569716	158.9712067	126.4802336	154.9898224	126.4802156	0	0
11-Jul-18 10:54:00	137.0025187	136.0071458	158.4735365	131.4569578	158.9712067	125.9825439	154.9898224	126.9779053	0	0
11-Jul-18 10:55:00	126.4802948	130.9593184	158.9712067	131.9546356	158.9712067	125.9825439	154.9898224	126.9779053	0	0
11-Jul-18 10:56:00	124.9871574	129.9639242	158.9712067	131.9546356	158.9712067	125.9825439	154.9898224	126.9779053	0	0
11-Jul-18 10:57:00	122.9965807	128.470958	158.9712067	131.9546356	158.9712067	125.9825439	154.9898224	127.4755735	0	0
11-Jul-18 10:58:00	137.0021382	134.5139517	158.9712067	131.9546356	158.9712067	126.4802165	154.9898224	127.9732513	0	0
11-Jul-18 10:59:00	157.9758759	144.0410004	158.4735527	131.9546356	158.9712067	126.480236	154.9898224	127.4755897	0	0
11-Jul-18 11:00:00	137.9982422	135.5096307	158.4735309	132.4523059	158.9712067	125.9825439	154.9898224	126.9779053	0	0
11-Jul-18 11:01:00	137.9974497	135.5092923	158.9712067	132.9499969	158.9712067	126.4802152	154.9898224	127.4755689	0	0
11-Jul-18 11:02:00	157.9758759	143.5433367	158.9712067	132.4523257	158.9712067	126.9779053	154.9898224	127.9732513	0	0
11-Jul-18 11:03:00	157.9758759	143.543318	158.9712067	131.9546356	158.9712067	126.480234	154.9898224	127.9732513	0	0
11-Jul-18 11:04:00	152.0039239	141.5526826	158.9712067	131.9546356	158.9712067	125.9825439	154.9898224	127.4755893	0	0
11-Jul-18 11:05:00	149.5153304	140.5572435	158.9712067	131.9546356	158.9712067	125.9825439	154.9898224	126.4802373	0	0
11-Jul-18 11:06:00	140.9841694	136.0072795	158.9712067	131.9546356	158.9712067	125.9825439	154.9898224	126.480212	0	0
11-Jul-18 11:07:00	143.4718678	136.5046325	158.9712067	131.9546356	158.9712067	125.4848912	154.9898224	127.4755657	0	0
11-Jul-18 11:08:00	157.9758759	143.0456543	158.9712067	131.9546356	158.9712067	125.4848692	154.9898224	127.4755877	0	0
11-Jul-18 11:09:00	151.0085232	140.5573195	158.9712067	131.9546356	158.9712067	125.9825439	154.9898224	126.9779053	0	0
11-Jul-18 11:10:00	151.0083531	140.5572587	158.9712067	131.9546356	158.9712067	125.9825439	154.9898224	126.9779053	0	0
11-Jul-18 11:11:00	147.5248468	138.9932212	158.9712067	131.9546356	158.9712067	125.9825439	154.9898224	126.9779053	0	0
11-Jul-18 11:12:00	136.5047982	134.4430145	158.9712067	131.4569687	158.9712067	125.4848846	154.9898224	126.9779053	0	0
11-Jul-18 11:13:00	140.4861126	136.5047516	158.9712067	131.4569549	158.9712067	124.9872131	154.9898224	126.9779053	0	0
11-Jul-18 11:14:00	143.0456918	137.5001668	158.9712067	131.9546356	158.9712067	125.4848692	154.9898224	126.9779053	0	0
11-Jul-18 11:15:00	146.0316052	138.4954461	158.9712067	131.9546356	158.9712067	125.9825439	154.9898224	126.9779053	0	0
11-Jul-18 13:15:00	130.4616558	131.9546559	158.9712067	130.9592896	158.9712067	125.9825439	155.4874891	125.9825439	0	0
11-Jul-18 13:16:00	142.9743194	137.5000385	158.9712067	130.9592896	158.9712067	125.4848866	155.9851685	125.9825439	0	0
11-Jul-18 13:17:00	157.4782033	143.5433354	158.9712067	131.4569545	158.9712067	125.4848704	155.9851685	125.9825439	0	0
11-Jul-18 13:18:00	147.5248731	138.9932377	158.9712067	131.4569707	158.9712067	125.4848866	155.9851685	125.9825439	0	0
11-Jul-18 13:19:00	126.5515561	129.4663776	158.9712067	130.9592896	158.9712067	125.4848688	155.4875052	126.4802149	0	0
11-Jul-18 13:20:00	121.0056845	126.4801677	158.9712067	131.4569512	158.9712067	125.4848899	154.9898224	126.480236	0	0
11-Jul-18 13:21:00	134.0162726	131.9545749	158.4735527	131.456974	158.9712067	124.9872131	154.9898224	126.4802132	0	0
11-Jul-18 13:22:00	137.5002263	133.9453658	158.4735299	131.4569512	158.9712067	125.4848671	154.9898224	126.9779053	0	0
11-Jul-18 13:23:00	124.9873376	128.4709904	158.9712067	131.9546356	158.9712067	125.9825439	155.4874881	126.480232	0	0
11-Jul-18 13:24:00	136.5046635	133.5186901	158.9712067	131.9546356	158.9712067	125.9825439	155.9851685	126.4802213	0	0
11-Jul-18 13:25:00	141.9793053	136.5048405	158.9712067	131.4569657	158.9712067	125.9825439	155.4874986	126.9779053	0	0
11-Jul-18 13:26:00	131.4569352	131.9546235	158.9712067	130.9592896	158.9712067	126.4802216	155.4874924	127.4755753	0	0
11-Jul-18 13:27:00	146.9558806	138.9931333	158.9712067	130.9592896	158.9712067	125.9825653	155.4874985	127.4755813	0	0
11-Jul-18 13:28:00	155.9852019	142.5480006	158.9712067	130.9592896	158.9712067	125.4848721	155.487489	126.9779053	0	0
11-Jul-18 13:29:00	150.5108266	140.0596282	158.9712067	131.9546235	158.9712067	125.9825439	155.4875053	126.9779053	0	0
11-Jul-18 13:30:00	149.0176948	140.0595905	158.9712067	132.4523253	158.9712067	126.4802156	154.9898224	126.9779053	0	0
11-Jul-18 13:31:00	154.4920927	142.547957	158.9712067	132.4523082	158.9712067	126.4802327	154.9898224	127.4755702	0	0
11-Jul-18 13:32:00	157.9758759	143.5433354	158.9712067	132.4523244	158.9712067	125.9825439	154.9898224	127.4755864	0	0

11-Jul-18 13:33:00	155.9852085	142.5479894	158.9712067	131.9546356	158.9712067	125.4848866	155.4874873	126.9779053	0	0
11-Jul-18 13:34:00	155.98513	142.5479697	158.9712067	131.9546356	158.9712067	124.9872131	155.4875069	126.9779053	0	0
11-Jul-18 13:35:00	157.9758759	143.0456543	158.9712067	131.4569774	158.9712067	124.9872131	154.9898224	126.9779053	0	0
11-Jul-18 13:36:00	145.9609563	137.5003086	158.9712067	130.9592896	158.9712067	124.9872131	155.4874807	126.4802393	0	0
11-Jul-18 13:37:00	125.9827865	128.9686779	158.9712067	130.9592896	158.9712067	125.4848639	155.4875101	126.4802099	0	0
11-Jul-18 13:38:00	137.9975005	134.0162953	158.9712067	130.9592896	158.9712067	125.4848866	154.9898224	126.9779053	0	0
11-Jul-18 13:39:00	147.5247511	137.9978304	158.9712067	130.9592896	158.9712067	125.484877	154.9898224	126.9779053	0	0
11-Jul-18 13:40:00	148.0223512	138.4954771	158.9712067	131.4569611	158.9712067	125.4848801	155.4874939	126.4802261	0	0
11-Jul-18 13:41:00	158.4735428	142.5479828	158.9712067	131.9546356	158.9712067	125.484877	155.9851685	126.4802231	0	0
11-Jul-18 13:42:00	139.4909088	134.5141297	158.9712067	131.9546356	158.9712067	126.4802231	155.9851685	126.4802261	0	0
11-Jul-18 13:43:00	139.4906126	135.0116756	158.9712067	131.9546356	158.9712067	126.4802311	155.4875019	126.4802182	0	0
11-Jul-18 13:44:00	157.9758759	143.0456543	158.9712067	131.456974	158.9712067	125.9825439	155.487484	126.9779053	0	0
11-Jul-18 13:45:00	157.9758759	143.0456543	158.9712067	131.4569445	158.9712067	125.9825439	155.9851685	126.9779053	0	0
11-Jul-18 13:46:00	142.477403	136.5050151	158.9712067	131.456979	158.9712067	125.484895	155.9851685	126.9779053	0	0
11-Jul-18 13:47:00	126.4802327	129.4662785	158.9712067	130.9592896	158.9712067	124.9872131	155.4875035	126.9779053	0	0
11-Jul-18 13:48:00	141.9789495	136.5046762	158.9712067	131.4569545	158.9712067	125.982543	155.4874873	126.9779053	0	0
11-Jul-18 13:49:00	157.9758759	143.543338	158.9712067	131.9546356	158.9712067	126.4802352	155.9851685	126.9779053	0	0
11-Jul-18 13:50:00	147.5249957	138.4956114	158.9712067	131.4569757	158.9712067	126.4802114	155.4875086	126.9779053	0	0
11-Jul-18 13:51:00	147.5244428	137.9977108	158.9712067	131.4569494	158.9712067	126.4802378	154.9898224	126.9779053	0	0
11-Jul-18 13:52:00	141.4819807	135.5096258	158.9712067	131.9546356	158.9712067	125.9825439	154.9898224	126.9779053	0	0
11-Jul-18 13:53:00	135.5092865	133.5186855	158.9712067	131.4569708	158.9712067	125.9825439	154.9898224	126.9779053	0	0
11-Jul-18 13:54:00	148.0223867	139.0642634	158.9712067	130.9592896	158.9712067	125.9825439	154.9898224	126.9779053	0	0
11-Jul-18 13:55:00	153.9944586	141.5526257	158.9712067	131.4569594	158.9712067	125.9825439	154.9898224	126.9779053	0	0
11-Jul-18 13:56:00	157.9758759	143.0456543	158.9712067	131.9546356	158.9712067	125.9825439	154.9898224	126.9779053	0	0
11-Jul-18 13:57:00	156.4828582	142.5479843	158.9712067	131.9546356	158.9712067	125.4848816	154.9898224	126.9779053	0	0
11-Jul-18 13:58:00	153.9944892	141.5526416	158.9712067	131.9546356	158.9712067	125.4848721	155.487489	126.9779053	0	0
11-Jul-18 13:59:00	155.4874537	142.5479516	158.9712067	131.4569725	158.9712067	125.4848884	155.4875053	126.9779053	0	0
11-Jul-18 14:00:00	157.9758759	143.5433354	158.9712067	131.4569545	158.9712067	125.4848704	155.4874873	126.4802327	0	0
11-Jul-18 14:01:00	158.4735349	143.543321	158.9712067	132.45231	158.9712067	125.9825439	155.4875018	126.977885	0	0
11-Jul-18 14:02:00	158.4735476	143.5433337	158.9712067	132.4523226	158.9712067	125.9825439	155.4874891	127.4755846	0	0
11-Jul-18 14:03:00	157.9758759	142.5479876	158.9712067	131.4569689	158.9712067	125.4848849	155.4875018	126.9779053	0	0
11-Jul-18 14:04:00	157.9758759	142.0503082	158.9712067	131.456953	158.9712067	125.4848689	154.9898224	126.9779053	0	0
11-Jul-18 14:05:00	157.9758759	142.5479684	158.9712067	131.4569755	158.9712067	125.4848914	155.4874825	126.4802375	0	0
11-Jul-18 14:06:00	138.496004	134.5143204	158.9712067	130.4616294	158.9712067	125.4848656	155.9851685	126.4802117	0	0
11-Jul-18 14:07:00	138.4949933	134.5138778	158.9712067	130.4616036	158.9712067	125.4848914	155.9851685	126.4802375	0	0
11-Jul-18 14:08:00	158.4735316	143.0456543	158.9712067	130.4616261	158.9712067	125.4848689	155.487505	126.480215	0	0
11-Jul-18 14:09:00	158.4735476	143.0456543	158.9712067	130.9592769	158.9712067	125.4848849	154.9898224	126.4802309	0	0
11-Jul-18 14:10:00	157.9758759	142.5479876	158.9712067	131.4569689	158.9712067	124.9872131	155.4874891	125.9825439	0	0
11-Jul-18 14:11:00	157.9758759	142.0503082	158.9712067	131.4569563	158.9712067	124.9872131	155.4875018	125.9825439	0	0
11-Jul-18 14:12:00	157.9758759	142.5479749	158.9712067	131.9546356	158.9712067	125.4848722	155.4874891	125.9825439	0	0
11-Jul-18 14:13:00	147.5248681	138.4955558	158.9712067	131.4569697	158.9712067	125.9825439	155.4875025	125.9825439	0	0
11-Jul-18 14:14:00	136.0071427	133.4476702	158.9712067	130.9592896	158.9712067	125.4848864	154.9898224	125.9825439	0	0
11-Jul-18 14:15:00	130.4616963	130.4616684	158.9712067	130.9592896	158.9712067	124.9872131	155.4874866	125.9825439	0	0
11-Jul-18 14:16:00	133.0209404	131.4569011	158.9712067	131.4569527	158.9712067	124.9872131	155.4875053	126.4802147	0	0
11-Jul-18 14:17:00	149.0175683	138.9930913	158.9712067	131.4569725	158.9712067	124.4895423	155.4874856	126.4802345	0	0
11-Jul-18 14:18:00	146.9561665	137.9979258	158.9712067	131.4569527	158.9712067	124.4895226	155.4875053	125.9825439	0	0
11-Jul-18 14:19:00	130.4617432	130.4616817	158.9712067	131.4569741	158.9712067	125.484867	154.9898224	126.4802131	0	0
11-Jul-18 14:20:00	141.4811082	135.5092535	158.9712067	131.4569494	158.9712067	124.9872242	154.9898224	126.4802378	0	0
11-Jul-18 14:21:00	157.9758759	143.0456543	158.9712067	131.4569757	158.9712067	124.9871716	154.9898224	126.4802114	0	0
11-Jul-18 14:22:00	149.5156428	138.9932789	158.9712067	130.9592896	158.9712067	125.4848917	155.4874823	126.4802378	0	0
11-Jul-18 14:23:00	149.5152662	138.9930985	158.9712067	130.9592896	158.9712067	125.4848696	155.9851685	126.4802156	0	0
11-Jul-18 14:24:00	142.9747086	136.5048621	158.9712067	130.9592896	158.9712067	124.9872075	155.4875002	126.9779053	0	0
11-Jul-18 14:25:00	142.9744186	136.5047357	158.9712067	131.4569578	158.9712067	124.4895277	155.4874906	126.4802294	0	0
11-Jul-18 14:26:00	149.5155008	138.9932109	158.9712067	131.9546356	158.9712067	124.9872131	155.9851685	125.9825439	0	0
11-Jul-18 14:27:00	143.5433109	136.5047914	158.9712067	131.4569674	158.9712067	124.9872131	155.9851685	125.9825439	0	0
11-Jul-18 14:28:00	144.5387053	137.0024893	158.9712067	130.9592896	158.9712067	125.4848704	155.9851685	126.4802165	0	0
11-Jul-18 14:29:00	141.0550001	135.4383659	158.9712067	130.4616279	158.9712067	125.4848899	155.9851685	126.480236	0	0
11-Jul-18 14:30:00	144.0408953	137.0024315	158.9712067	129.9639435	158.9712067	124.9872131	155.4875052	126.4802149	0	0
11-Jul-18 14:31:00	146.0317411	138.5665975	158.9712067	130.4616084	158.9712067	125.4848704	154.9898224	126.9779053	0	0
11-Jul-18 14:32:00	150.5106436	140.5572486	158.9712067	130.9592896	158.9712067	124.9872141	154.9898224	126.4802327	0	0
11-Jul-18 14:33:00	157.9758759	143.0456543	158.9712067	130.9592896	158.9712067	123.9918518	155.4874873	125.9825439	0	0
11-Jul-18 14:34:00	152.9992429	140.5573416	158.9712067	130.461627	158.9712067	124.489522	155.4875059	126.4802141	0	0
11-Jul-18 14:35:00	152.9990088	140.0595645	158.9712067	129.9639435	158.9712067	124.4895454	154.9898224	126.4802375	0	0
11-Jul-18 14:36:00	157.4782081	142.0503082	158.9712067	130.4616036	158.9712067	124.4895196	154.9898224	125.9825439	0	0
11-Jul-18 14:37:00	157.4781823	142.5479684	158.9712067	130.9592896	158.9712067	124.9872131	155.4874825	125.9825439	0	0
11-Jul-18 14:38:00	156.482873	142.0503242	158.9712067	130.9592896	158.9712067	124.9872131	155.4875034	125.9825439	0	0
11-Jul-18 14:39:00	156.48284	141.5526322	158.9712067	130.9592896	158.9712067	124.9872131	154.9898224	126.4802216	0	0
11-Jul-18 14:40:00	149.0178006	138.4955204	158.9712067	130.9592896	158.9712067	125.4848755	155.4874924	126.4802276	0	0
11-Jul-18 14:41:00	136.5048282	132.9500015	158.9712067	130.4616196	158.9712067	125.4848816	155.4874985	125.9825439	0	0
11-Jul-18 14:42:00	137.0024548	132.9499772	158.9712067	130.9592835	158.9712067	124.9872131	154.9898224	125.9825439	0	0
11-Jul-18 14:43:00	149.5153114	138.4954535	158.9712067	131.4569689	158.9712067	124.9872131	154.9898224	125.9825439	0	0
11-Jul-18 14:44:00	152.9992341	140.5573104	158.9712067	130.4616261	158.9712067	124.9872131	154.9898224	125.9825439	0	0
11-Jul-18 14:45:00	144.538743	137.0025086	158.9712067	130.4616077	158.9712067	124.9872131	154.9898224	125.4848874	0	0
11-Jul-18 14:46:00	145.0362816	137.0024384	158.9712067	130.9592896	158.9712067	125.4848704	154.9898224	125.4848704	0	0
11-Jul-18 14:47:00	145.5340762	137.0025055	158.9712067	130.4616246	158.9712067	125.4848866	154.9898224	125.9825439	0	0
11-Jul-18 14:48:00	139.5619759	134.4430165	158.9712067	130.4616084	158.9712067	125.4848704	154.9898224	125.9825439	0	0
11-Jul-18 14:49:00	142.5478643	136.0070818	158.9712067	131.456952	158.9712067	125.4848892	154.9898224	125.9825439	0	0
11-Jul-18 14:50:00	144.5387732	137.0025001	158.9712067	130.9593159	158.9712067	124.9872131	154.9898224	125.9825439	0	0
11-Jul-18 14:51:00	135.0119396	132.9500607	158.9712067	130.4616034	158.9712067	124.9872131	154.9898224	125.9825439	0	0
11-Jul-18 14:52:00	141.4812059	135.5093062	158.9712067	130.9592896	158.9712067	124.9872131	154.9898224	125.9825439	0	0
11-Jul-18 14:53:00	149.5154991	139.5619723	158.9712067	130.4616263	158.9712067	124.9872131	154.9898224	126.4802149	0	0
11-Jul-18 14:54:00	131.030566	131.5281517	158.9712067	129.9639435	158.9712067	124.9872131	154.9898224	126.9779053	0	0
11-Jul-18 14:55:00	122.001104	126.97788	158.9712067	130.4616102	158.9712067	125.4848722	154.9898224	126.4802309	0	0
11-Jul-18 14:56:00	140.486019	135.0117029	158.9712067	130.9592896	158.9712067	125.9825439	154.9898224	125.9825439	0	0
11-Jul-18 14:57:00	138.9933548	134.5141899	158.9712067	130.9592896	158.9712067	125.4848849	154.9898224	126.4802183	0	0
11-Jul-18 14:58:00	124.9871819	128.4709164	158.9712067	130.9592896	158.9712067	124.9872131	154.9898224	126.9779053	0	0
11-Jul-18 14:59:00	130.4615299	130.9592587	158.9712067	130.9592896	158.9712067	125.4848689	154.9898224	126.4802342	0	0
11-Jul-18 15:00:00	132.9500349	132.4523277	158.9712067	130.4616279	158.9712067	125.4848899	154.9898224	125.4848899	0	0
11-Jul-18 15:01:00	139.4906191	136.0070187	158.9712067	130.9592632	158.9712067	124.9872131	154.9898224	125.4848654	0	0
11-Jul-18 15:02:00	152.9990063	141.0549358	158.9712067	130.9593159	158.9712067	124.4895456	154.9898224	125.9825439	0	0
11-Jul-18 15:03:00	157.9758759	142.0503082	158.9712067	130.4616034	158.9712067	123.9918518	154.9898224	125.4848917	0	0
11-Jul-18 15:04:00	148.0226783	137.9979314	158.4735552	130.9592896	158.9712067	124.4895185	154.9898224	125.4848646	0	0
11-Jul-18 15:05:00	148.0221063	137.9976984	158.4735266	130.9592896	158.9712067	124.9872131	154.9898224	125.4848932	0	0
11-Jul-18 15:06:00	157.9758759	142.0503082	158.9712067	130.4616312	158.9712067	124.9872131	154.9898224	125.4848639	0	0
11-Jul-18 15:07:00	157.9758759	142.0503082	158.9712067	130.4616018	158.9712067	124.9872131	154.9898224	125.9825439	0	0
11-Jul-18 15:08:00	143.4724727	136.0072242	158.9712067	130.9592896	158.9712067	125.4848704	154.9898224	125.9825439	0	0
11-Jul-18 15:09:00	143.4721924	136.5047789	158.9712067	130.9592896	158.9712067	125.4848801	154.9898224	125.9825439	0	0
11-Jul-18 15:10:00	153.9944961	141.5526397	158.9712067	130.461618	158.9712067	124.9872131	154.9898224	125.9825439	0	0
11-Jul-18 15:11:00	148.5200699	139.5619369	158.9712067	129.9639435	158.9712067	124.9872131	154.9898224	125.9825439	0	0
11-Jul-18 15:12:00	151.0084183	140.5572769	158.9712067	130.461615	158.9712067	124.9872131	154.9898224	125.9825439	0	0
11-Jul-18 15:13:00	148.022495	138.9932092	158.9712067	130.9592896	158.9712067	124.4895398	154.9898224	125.9825439	0	0
11-Jul-18 15:14:00	145.0362411	137.0024437	158.9712067	130.9592896	158.9712067	123.9918518	154.9898224	125.9825439	0	0
11-Jul-18 15:15:00	137.5004214	133.0212122	158.9712067	130.4616288	158.9712067	124.4895202	155.4874831	125.9825439	0	0
11-Jul-18 15:16:00	129.9638447	129.9638979	158.9712067	130.4616051	158.9712067	124.9872131	155.4875068	126.4802132	0	0
11-Jul-18 15:17:00	137.9977252	134.5140405	158.9712067	130.9592896	158.9712067	124.9872131	154.9898224	126.480236	0	0
11-Jul-18 15:18:00	141.0549849	135.509481	158.9712067	130.9592896	158.9712067	124.9872131	154.9898224	125.9825439	0	0
11-Jul-18 15:19:00	133.5189437	131.4570322	158.9712067	130.9592896	158.9712067	124.9872131	154.9898224	125.9825439	0	0
11-Jul-18 15:20:00	133.5185444	131.9545445	158.9712067	131.4569461	158.9712067	124.4895489	154.9898224	125.9825439	0	0
11-Jul-18 15:21:00	129.5377166	129.9641156	155.9852672	130.4616659	158.9712067	124.987165	154.9898224	125.9825439	0	0
11-Jul-18 15:22:00	117.0244951	124.4895489	155.9850697	129.466254	158.9712067	124.9872308	154.9898224	125.9825439	0	0

11-Jul-18 15:23:00	122.0009848	126.9778194	158.9712067	130.4616035	158.9712067	124.4895194	154.9898224	126.4802116	0	0
11-Jul-18 15:24:00	139.9882971	135.5093456	158.9712067	131.456953	158.9712067	124.4895421	154.9898224	126.4802342	0	0
11-Jul-18 15:25:00	144.0411274	137.5002137	158.9712067	131.4569722	158.9712067	123.9918518	154.9898224	125.9825439	0	0
11-Jul-18 15:26:00	132.5234949	131.9546741	158.9712067	130.9592896	158.9712067	124.4895229	154.9898224	126.480215	0	0
11-Jul-18 15:27:00	131.4568444	130.9592536	158.9712067	130.4616345	158.9712067	124.9872131	154.9898224	126.9779053	0	0
11-Jul-18 15:28:00	133.4477163	131.9546356	158.9712067	130.4615985	158.9712067	124.9872131	154.9898224	126.4802426	0	0
11-Jul-18 15:29:00	137.5000378	133.9452893	158.9712067	131.456953	158.9712067	124.9872131	154.9898224	125.9825439	0	0
11-Jul-18 15:30:00	138.4955639	134.4430323	158.9712067	131.4569706	158.9712067	124.9872131	154.9898224	125.9825439	0	0
12-Jul-18 08:10:00	140.0595918	137.002466	158.9712067	132.9499969	158.9712067	127.4755755	154.9898224	128.4709272	0	0
12-Jul-18 08:11:00	150.5107233	141.5526157	158.9712067	132.9499969	158.9712067	127.9732513	154.9898224	128.4709216	0	0
12-Jul-18 08:12:00	157.9758759	145.0363464	158.9712067	133.4476596	158.9712067	127.4755811	154.9898224	128.4709272	0	0
12-Jul-18 08:13:00	157.9758759	145.0363464	158.9712067	133.4476684	158.9712067	126.9779053	154.9898224	127.9732513	0	0
12-Jul-18 08:14:00	157.9758759	145.0363464	158.9712067	133.447653	158.9712067	127.4755689	155.4874861	127.9732513	0	0
12-Jul-18 08:15:00	157.9758759	145.0363464	158.9712067	133.4476711	158.9712067	127.9732513	155.4875042	128.4709156	0	0
12-Jul-18 08:16:00	157.9758759	145.0363464	158.9712067	133.4476543	158.9712067	127.9732513	154.9898224	128.4709325	0	0
12-Jul-18 08:17:00	152.5015463	143.0456867	158.9712067	133.9453278	158.9712067	127.4755864	154.9898224	128.4709163	0	0
12-Jul-18 08:18:00	152.5013681	142.547957	158.9712067	133.9453278	158.9712067	127.4755702	154.9898224	128.4709325	0	0
12-Jul-18 08:19:00	157.9758759	144.5386635	158.9712067	134.4429986	158.9712067	127.9732513	154.9898224	128.4709145	0	0
12-Jul-18 08:20:00	143.4725723	138.4956424	158.9712067	134.4430199	158.9712067	127.4755898	155.4874839	128.9685974	0	0
12-Jul-18 08:21:00	143.4719047	137.9976797	158.9712067	133.9453278	158.9712067	127.9732286	155.4875068	128.9685974	0	0
12-Jul-18 08:22:00	144.4678919	138.9932796	158.9712067	133.9453278	158.9712067	128.9685974	154.9898224	128.4709358	0	0
12-Jul-18 08:23:00	126.4802907	131.4569993	158.4735486	133.4476697	158.9712067	128.4709317	154.9898224	127.9732513	0	0
12-Jul-18 08:24:00	139.9883988	137.0024188	158.473538	133.4476591	158.9712067	127.9732513	154.9898224	127.9732513	0	0
12-Jul-18 08:25:00	157.9758759	145.0363464	158.9712067	133.4476656	158.9712067	127.9732513	154.9898224	127.9732513	0	0
12-Jul-18 08:26:00	157.9758759	145.0363464	158.9712067	133.4476591	158.9712067	127.9732513	154.9898224	127.9732513	0	0
12-Jul-18 08:27:00	157.9758759	144.5386766	158.9712067	134.4430053	158.9712067	127.9732513	155.4874923	128.4709212	0	0
12-Jul-18 08:28:00	157.9758759	144.0410004	158.9712067	134.9406891	158.9712067	127.9732513	155.4875019	128.4709308	0	0
12-Jul-18 08:29:00	157.9758759	144.5386635	158.9712067	133.9453628	158.9712067	127.9732513	154.9898224	127.9732513	0	0
12-Jul-18 08:30:00	151.0085869	142.0503644	158.9712067	133.4476517	158.9712067	127.9732513	154.9898224	128.4709137	0	0
12-Jul-18 08:31:00	144.538662	139.561924	158.9712067	134.442997	158.9712067	128.470913	155.487484	128.9685974	0	0
12-Jul-18 08:32:00	151.5059631	141.552601	158.9712067	133.9453658	158.9712067	128.4709358	155.4875068	128.4709358	0	0
12-Jul-18 08:33:00	157.9758759	143.5433159	158.9712067	132.9499969	158.9712067	127.4755897	154.9898224	127.9732513	0	0
12-Jul-18 08:34:00	157.9758759	144.0410004	158.9712067	133.4476493	158.9712067	127.4755653	154.9898224	127.9732513	0	0
12-Jul-18 08:35:00	157.9758759	143.543342	158.9712067	132.9500111	158.9712067	127.9732513	154.9898224	127.475593	0	0
12-Jul-18 08:36:00	157.9758759	143.5433127	158.9712067	132.4523016	158.9712067	127.475593	154.9898224	127.4755636	0	0
12-Jul-18 08:37:00	157.9758759	144.5386587	158.9712067	132.9499969	158.9712067	127.4755636	154.9898224	127.9732513	0	0
12-Jul-18 08:38:00	157.9758759	145.0363464	158.9712067	133.4476518	158.9712067	127.9732513	154.9898224	127.9732513	0	0
12-Jul-18 08:39:00	157.9758759	145.0363464	158.9712067	133.9453278	158.9712067	127.9732513	154.9898224	127.4755846	0	0
12-Jul-18 08:40:00	148.5201855	141.0550052	158.9712067	134.4430021	158.9712067	127.4755846	154.9898224	127.475572	0	0
12-Jul-18 08:41:00	148.5199451	141.0549039	158.9712067	134.4430148	158.9712067	126.9779053	154.9898224	127.9732513	0	0
12-Jul-18 08:42:00	157.9758759	145.0363464	158.9712067	133.9453278	158.9712067	126.9779053	154.9898224	127.9732513	0	0
12-Jul-18 08:43:00	157.9758759	145.0363464	158.9712067	133.9453278	158.9712067	127.4755711	154.9898224	127.9732513	0	0
12-Jul-18 08:44:00	157.9758759	145.0363464	158.9712067	133.4476705	158.9712067	127.4755864	154.9898224	127.9732513	0	0
12-Jul-18 08:45:00	157.9758759	144.5386823	158.9712067	133.4476535	158.9712067	127.4755694	154.9898224	128.4709155	0	0
12-Jul-18 08:46:00	157.9758759	144.5386638	158.9712067	133.9453278	158.9712067	127.9732513	154.9898224	128.9685974	0	0
12-Jul-18 08:47:00	157.9758759	145.0363464	158.9712067	133.447672	158.9712067	127.9732513	154.9898224	128.470934	0	0
12-Jul-18 08:48:00	157.9758759	145.0363464	158.9712067	133.4476527	158.9712067	127.4755879	154.9898224	128.4709148	0	0
12-Jul-18 08:49:00	148.0226252	141.0550446	158.9712067	133.9453278	158.9712067	127.475567	155.4874842	127.9732739	0	0
12-Jul-18 08:50:00	140.0595645	137.5712304	158.9712067	133.9453278	158.9712067	127.9732513	155.4875083	127.4755654	0	0
12-Jul-18 08:51:00	144.0409564	138.5665764	158.9712067	133.9453278	158.9712067	127.9732513	154.9898224	128.4709115	0	0
12-Jul-18 08:52:00	152.0036369	141.552563	158.9712067	133.4476753	158.9712067	127.9732513	155.4874825	128.4709373	0	0
12-Jul-18 08:53:00	151.0085604	141.0550146	158.47355	133.4476536	158.9712067	127.9732513	155.4875042	127.9732513	0	0
12-Jul-18 08:54:00	151.0083743	141.5526033	158.4735367	133.9453278	158.9712067	127.9732513	154.9898224	128.4709198	0	0
12-Jul-18 08:55:00	155.4875258	144.0410095	158.9712067	133.9453278	158.9712067	127.9732513	154.9898224	128.9685974	0	0
12-Jul-18 08:56:00	148.0224378	140.5573119	158.9712067	133.9453278	158.9712067	127.9732513	154.9898224	128.9685974	0	0
12-Jul-18 08:57:00	150.5106967	141.0549348	158.9712067	133.9453278	158.9712067	128.4709198	154.9898224	128.4709289	0	0
12-Jul-18 08:58:00	157.9758759	144.5386663	158.9712067	133.9453278	158.9712067	128.4709315	154.9898224	127.9732513	0	0
12-Jul-18 08:59:00	157.9758759	145.0363464	158.9712067	133.447672	158.9712067	127.9732513	154.9898224	128.4709148	0	0
12-Jul-18 09:00:00	157.9758759	145.0363464	158.9712067	133.4476527	158.9712067	127.9732513	154.9898224	128.470934	0	0
12-Jul-18 09:01:00	157.9758759	145.5340175	158.9712067	134.4429988	158.9712067	128.4709148	154.9898224	128.4709148	0	0
12-Jul-18 09:02:00	157.9758759	145.5340367	158.9712067	133.9453623	158.9712067	128.470934	154.9898224	128.470934	0	0
12-Jul-18 09:03:00	157.9758759	144.538683	158.9712067	132.9499969	158.9712067	127.4755879	154.9898224	127.9732513	0	0
12-Jul-18 09:04:00	157.9758759	144.5386605	158.9712067	132.9499969	158.9712067	126.9779053	154.9898224	127.9732513	0	0
12-Jul-18 09:05:00	157.9758759	144.5303951	158.9712067	132.9499969	158.9712067	126.9780432	154.9898224	127.9732513	0	0
12-Jul-18 09:06:00	157.9758759	144.0411383	158.9712067	132.949859	158.9712067	127.4920132	154.9898224	127.9733893	0	0
12-Jul-18 09:07:00	157.9758759	144.5551083	158.9712067	132.4360191	158.9712067	127.9732513	154.9898224	128.4872236	0	0
12-Jul-18 09:08:00	157.9758759	145.0363464	158.9712067	132.4690281	158.9712067	127.9732513	154.9898224	128.4627768	0	0
12-Jul-18 09:09:00	157.9758759	145.0363464	158.9712067	133.9616477	158.9712067	127.9732513	154.9898224	127.9732513	0	0
12-Jul-18 09:10:00	157.9758759	144.5386797	158.9712067	134.4430148	158.9712067	127.9732513	154.9898224	127.9732513	0	0
12-Jul-18 09:11:00	157.9758759	144.0410004	158.9712067	133.4476687	158.4735476	127.9732513	155.4874891	127.9732513	0	0
12-Jul-18 09:12:00	157.9758759	144.5386672	158.9712067	133.4476562	158.4735351	127.9732513	155.4875016	128.4709182	0	0
12-Jul-18 09:13:00	157.9758759	145.0363464	158.9712067	133.9453278	158.9712067	127.9732513	154.9898224	128.470933	0	0
12-Jul-18 09:14:00	142.9748993	138.4956374	158.9712067	134.4429973	158.9712067	127.9732513	154.9898224	128.4709132	0	0
12-Jul-18 09:15:00	138.9929391	137.5000279	158.9712067	134.9406891	158.9712067	127.9732513	154.9898224	128.4709349	0	0
12-Jul-18 09:16:00	153.994405	144.0409806	158.9712067	134.4430183	158.9712067	127.4755882	154.9898224	127.9732513	0	0
12-Jul-18 09:17:00	157.9758759	145.0363464	158.9712067	133.9453278	158.9712067	126.9779053	154.9898224	127.9732513	0	0
12-Jul-18 09:18:00	157.9758759	145.0363464	158.9712067	134.4429988	158.9712067	127.4755687	154.9898224	127.9732513	0	0
12-Jul-18 09:19:00	157.9758759	145.0363464	158.9712067	134.4430198	158.9712067	127.9732513	155.487484	127.9732513	0	0
12-Jul-18 09:20:00	157.9758759	145.0363464	158.9712067	133.9453278	158.9712067	127.9732513	155.4875086	128.4709112	0	0
12-Jul-18 09:21:00	157.9758759	145.0363464	158.9712067	133.4476755	158.9712067	127.9732513	154.9898224	129.4662573	0	0
12-Jul-18 09:22:00	157.9758759	145.0363464	158.9712067	133.9453169	158.9712067	127.9732513	154.9898224	129.4662835	0	0
12-Jul-18 09:23:00	157.9758759	145.0363464	158.9712067	134.4430173	158.9712067	127.9732513	154.9898224	128.9685974	0	0
12-Jul-18 09:24:00	157.9758759	144.5386782	158.9712067	133.9453278	158.9712067	128.4709196	154.9898224	128.4709292	0	0
12-Jul-18 09:25:00	157.9758759	144.5386686	158.9712067	133.9453278	158.9712067	128.9685974	154.9898224	127.9732513	0	0
12-Jul-18 09:26:00	157.9758759	145.0363464	158.9712067	133.9453278	158.9712067	128.4709292	154.9898224	128.4709196	0	0
12-Jul-18 09:27:00	157.9758759	145.0363464	158.9712067	133.9453278	158.9712067	128.4709196	154.9898224	128.4709292	0	0
12-Jul-18 09:28:00	157.9758759	145.0363464	158.9712067	133.9453278	158.9712067	128.9685974	154.9898224	128.4709163	0	0
12-Jul-18 09:29:00	157.9758759	145.0363464	158.9712067	133.9453278	158.9712067	128.9685974	154.9898224	128.9685974	0	0
12-Jul-18 09:30:00	157.9758759	145.0363464	158.9712067	133.9453278	158.9712067	128.470935	154.9898224	128.9685974	0	0
12-Jul-18 09:31:00	157.9758759	145.5340172	158.9712067	133.9453278	158.9712067	128.4709145	154.9898224	128.9685974	0	0
12-Jul-18 09:32:00	157.9758759	145.0363738	158.9712067	133.9453278	158.9712067	127.9732711	154.9898224	128.4709342	0	0
12-Jul-18 09:33:00	157.9758759	144.5386635	158.9712067	133.9453278	158.9712067	127.4755684	154.9898224	127.9732513	0	0
12-Jul-18 09:34:00	157.9758759	144.5386849	158.9712067	133.4476739	158.9712067	127.9732513	154.9898224	127.4755898	0	0
12-Jul-18 09:35:00	157.9758759	144.0410004	158.4735544	132.9499969	158.9712067	127.9732513	154.9898224	127.973225	0	0
12-Jul-18 09:36:00	157.9758759	144.5386602	158.4735281	133.4476492	158.9712067	127.9732513	154.9898224	128.4709375	0	0
12-Jul-18 09:37:00	157.9758759	145.0363464	158.9712067	133.9453278	158.9712067	127.9732513	154.9898224	127.9732513	0	0
12-Jul-18 09:38:00	157.9758759	145.0363464	158.9712067	133.9453278	158.9712067	127.4755864	154.9898224	127.9732513	0	0
12-Jul-18 09:39:00	157.9758759	145.0363464	158.9712067	133.4476654	158.9712067	127.4755753	154.9898224	127.9732513	0	0
12-Jul-18 09:40:00	157.9758759	145.0363464	158.9712067	132.9499969	158.9712067	127.4755813	154.9898224	128.4709213	0	0
12-Jul-18 09:41:00	157.9758759	144.5386764	158.9712067	132.9499969	158.9712067	127.4755753	154.9898224	128.4709274	0	0
12-Jul-18 09:42:00	157.9758759	144.0410004	158.9712067	133.4476593	158.9712067	127.4755813	154.9898224	127.9732513	0	0
12-Jul-18 09:43:00	157.9758759	144.0410004	158.9712067	133.9453278	158.9712067	127.4755703	154.9898224	128.4709164	0	0
12-Jul-18 09:44:00	144.9655932	138.993295	158.9712067	133.4476753	158.9712067	127.9732513	154.9898224	128.9685974	0	0
12-Jul-18 09:45:00	145.1818082	139.9883825	158.9712067	133.4559456	158.9712067	128.4709132	154.9898224	128.9685974	0	0
12-Jul-18 09:46:00	157.9758759	145.0199217	158.9712067	133.9453278	158.9712067	128.4626392	154.9898224	128.4709337	0	0
12-Jul-18 09:47:00	157.9742188	144.5543001	158.9712067	133.9453278	158.9712067	127.9732513	154.9898224	128.4792096	0	0
12-Jul-18 09:48:00	151.8081216	142.0014043	158.9712067	133.9453278	158.9712067	127.9732513	154.9898224	128.9685974	0	0
12-Jul-18 09:49:00	152.1015539	142.0502292	158.9712067	133.9453278	158.9712067	127.9732513	154.9898224	128.9685974	0	0
12-Jul-18 09:50:00	157.9758759	145.0363464	158.9712067	133.9453278	158.9712067	127.9732513	154.9898224	128.9685974	0	0
12-Jul-18 11:45:00	157.9758759	144.5386834	158.9712067	133.9453278	158.9712067	127.4755683	154.9898224	127.9732513	0	0

12-Jul-18 11:46:00	142.4771822	137.5002681	158.4735506	133.4476717	158.9712067	127.9732513	154.9898224	127.9732513	0	0
12-Jul-18 11:47:00	142.4765989	137.9976855	158.4735319	132.9499969	158.9712067	127.4755877	154.9898224	127.9732513	0	0
12-Jul-18 11:48:00	151.5062329	141.5527008	158.9712067	133.447653	158.9712067	127.4755689	154.9898224	128.470915	0	0
12-Jul-18 11:49:00	151.5059565	141.5525519	158.9712067	133.4476743	158.9712067	127.4755902	154.9898224	128.4709363	0	0
12-Jul-18 11:50:00	157.9758759	145.0363464	158.9712067	133.4476479	158.9712067	127.4755639	154.9898224	127.9732513	0	0
12-Jul-18 11:51:00	157.4782096	145.0363464	158.9712067	133.9453278	158.9712067	128.4709099	154.9898224	127.9732513	0	0
12-Jul-18 11:52:00	157.4781808	145.0363464	158.9712067	133.4476768	158.9712067	127.9732802	154.9898224	128.4709099	0	0
12-Jul-18 11:53:00	146.9561553	140.4862688	158.9712067	133.447653	158.9712067	127.4755689	154.9898224	128.9685974	0	0
12-Jul-18 11:54:00	140.4861438	137.5001238	158.9712067	133.9453278	158.9712067	127.9732513	154.9898224	128.9685974	0	0
12-Jul-18 11:55:00	137.5002101	136.0071523	158.9712067	133.9453278	158.9712067	127.9732513	154.9898224	128.9685974	0	0
12-Jul-18 11:56:00	143.9697886	138.4954507	158.9712067	133.9453278	158.9712067	127.9732513	154.9898224	128.9685974	0	0
12-Jul-18 11:57:00	157.9758759	144.5386691	158.9712067	133.9453278	158.9712067	128.4709201	154.9898224	128.9685974	0	0
12-Jul-18 11:58:00	157.9758759	145.0363464	158.9712067	133.4476692	158.9712067	128.4709312	154.9898224	128.9685974	0	0
12-Jul-18 11:59:00	157.9758759	144.5386828	158.9712067	132.9499969	158.9712067	127.9732513	154.9898224	128.4709337	0	0
12-Jul-18 12:00:00	157.9758759	145.0363353	158.9712067	133.447653	158.9712067	127.9732513	154.9898224	128.470915	0	0
12-Jul-18 12:01:00	157.9758759	145.5340365	158.9712067	134.4429991	158.9712067	127.9732513	154.9898224	128.9685974	0	0
12-Jul-18 12:02:00	157.9758759	144.5386828	158.9712067	134.4430178	158.9712067	127.9732513	154.9898224	128.4709337	0	0
12-Jul-18 12:03:00	157.9758759	144.538664	158.9712067	133.9453278	158.9712067	127.9732513	154.9898224	127.9732513	0	0
12-Jul-18 12:04:00	157.9758759	144.5386844	158.9712067	132.9500037	158.9712067	127.9732513	154.9898224	127.9732513	0	0
12-Jul-18 12:05:00	157.9758759	144.0410004	158.9712067	132.9499564	158.9712067	127.9732513	154.9898224	127.9732513	0	0
12-Jul-18 12:06:00	157.9758759	144.0410004	158.9712067	133.9453278	158.9712067	127.9732513	154.9898224	127.9732513	0	0
12-Jul-18 12:07:00	137.0030129	134.514349	158.9712067	133.447675	158.9712067	127.475591	154.9898224	127.9732513	0	0
12-Jul-18 12:08:00	137.0021222	134.5139444	158.9712067	132.9499969	158.9712067	127.4755698	154.9898224	127.9732513	0	0
12-Jul-18 12:09:00	157.9758759	144.0410004	158.9712067	133.4476581	158.9712067	127.9732513	154.9898224	127.9732513	0	0
12-Jul-18 12:10:00	146.9560432	139.4908841	158.9712067	133.9453278	158.9712067	127.9732513	154.9898224	128.4709201	0	0
12-Jul-18 12:11:00	146.9558526	139.9884741	158.9712067	134.4430041	158.9712067	127.4755826	154.9898224	128.9685974	0	0
12-Jul-18 12:12:00	144.4676995	138.9932239	158.9712067	134.4430127	158.9712067	126.9779053	154.9898224	128.9685974	0	0
12-Jul-18 12:13:00	144.4673972	138.4954225	158.9712067	133.9453278	158.9712067	127.4755715	154.9898224	128.4709312	0	0
12-Jul-18 12:14:00	157.9758759	144.538664	158.9712067	133.9453278	158.9712067	127.4755877	154.9898224	128.470915	0	0
12-Jul-18 12:15:00	157.9758759	145.0363464	158.9712067	133.9453278	158.9712067	127.4755673	154.9898224	128.4709354	0	0
12-Jul-18 12:16:00	157.9758759	144.5386861	158.9712067	133.9453278	158.9712067	127.9732513	154.9898224	128.4709117	0	0
12-Jul-18 12:17:00	157.9758759	144.5386607	158.9712067	133.9453278	158.9712067	127.9732513	154.9898224	128.9685974	0	0
12-Jul-18 12:18:00	157.9758759	144.5386861	158.9712067	133.9453278	158.9712067	127.9732513	154.9898224	128.9685974	0	0
12-Jul-18 12:19:00	157.9758759	144.0410004	158.9712067	133.9453278	158.9712067	127.9732513	154.9898224	128.4709387	0	0
12-Jul-18 12:20:00	157.9758759	144.5386575	158.9712067	133.9453278	158.9712067	127.4755943	154.9898224	127.9732513	0	0
12-Jul-18 12:21:00	157.9758759	144.5386893	158.4735572	132.4523565	158.9712067	127.4755624	154.9898224	127.9732513	0	0
12-Jul-18 12:22:00	152.9992973	141.5527073	158.4735253	132.4522608	158.9712067	127.9732513	155.4874795	127.9732513	0	0
12-Jul-18 12:23:00	152.9989949	142.0502148	158.9712067	133.9453278	158.9712067	127.9732513	155.4875097	127.9732513	0	0
12-Jul-18 12:24:00	157.9758759	145.0363464	158.9712067	133.9453278	158.9712067	127.9732513	154.9898224	128.4709117	0	0
12-Jul-18 12:25:00	157.9758759	145.0363464	158.9712067	134.4429958	158.9712067	127.9732513	154.9898224	128.9685974	0	0
12-Jul-18 12:26:00	142.4772847	138.4956574	158.9712067	134.4430211	158.9712067	127.475591	154.9898224	128.9685974	0	0
12-Jul-18 12:27:00	141.481168	137.9976643	158.9712067	133.9453278	158.9712067	126.9779053	154.9898224	128.9685974	0	0
12-Jul-18 12:28:00	156.9804968	144.0410004	158.9712067	133.9453278	158.9712067	127.4755657	154.9898224	128.9685974	0	0
12-Jul-18 12:29:00	157.9758759	144.5386607	158.9712067	133.447675	158.9712067	127.9732513	154.9898224	128.470937	0	0
12-Jul-18 12:30:00	145.9608676	139.4909598	158.9712067	133.4476513	158.9712067	127.9732513	154.9898224	128.4709134	0	0
12-Jul-18 12:31:00	145.9603757	138.9930691	158.9712067	133.9453278	158.9712067	127.9732513	154.9898224	129.4662611	0	0
12-Jul-18 12:32:00	151.0085692	141.5526744	158.9712067	133.9453278	158.9712067	127.4755877	154.9898224	129.4662798	0	0
12-Jul-18 12:33:00	151.008307	141.5525807	158.4735506	133.4476717	158.9712067	127.4755689	154.9898224	128.4709337	0	0
12-Jul-18 12:34:00	157.9758759	144.5386624	158.4735302	132.9499969	158.9712067	127.9732513	154.9898224	127.9732513	0	0
12-Jul-18 12:35:00	157.9758759	144.5386861	158.9712067	133.4476497	158.9712067	127.9732513	154.9898224	127.9732513	0	0
12-Jul-18 12:36:00	157.9758759	144.0410004	158.9712067	133.447675	158.9712067	127.9732513	154.9898224	127.9732513	0	0
12-Jul-18 12:37:00	157.9758759	144.0410004	158.9712067	132.9499969	158.9712067	127.475591	154.9898224	127.9732513	0	0
12-Jul-18 12:38:00	157.9758759	144.0410004	158.4735489	132.9499969	158.9712067	127.4755707	154.9898224	127.9732513	0	0
12-Jul-18 12:39:00	157.9758759	144.0410004	158.4735387	133.4476598	158.9712067	127.4755808	154.9898224	128.4709218	0	0
12-Jul-18 12:40:00	138.4955977	135.5094962	158.9712067	133.4476649	158.9712067	127.4755758	154.9898224	127.9732564	0	0
12-Jul-18 12:41:00	123.9918341	128.9685873	158.9712067	133.4476598	158.9712067	127.4755808	154.9898224	127.4755758	0	0
12-Jul-18 12:42:00	143.4721629	137.9977822	158.9712067	133.9453278	158.9712067	127.4755758	154.9898224	128.4709218	0	0
12-Jul-18 12:43:00	157.9758759	145.0363464	158.9712067	133.4476674	158.9712067	127.9732513	154.9898224	128.9685974	0	0
12-Jul-18 12:44:00	157.9758759	144.538681	158.9712067	132.9499969	158.9712067	127.9732513	154.9898224	128.470932	0	0
12-Jul-18 12:45:00	157.9758759	144.5386666	158.9712067	133.4476555	158.9712067	127.9732513	154.9898224	128.4709175	0	0
12-Jul-18 12:46:00	157.9758759	145.0363464	158.9712067	133.4476684	158.9712067	127.4755844	154.9898224	128.9685974	0	0
12-Jul-18 12:47:00	157.9758759	144.5386795	158.9712067	132.9499969	158.9712067	127.4755722	154.9898224	128.4709305	0	0
12-Jul-18 12:48:00	157.9758759	144.0410004	158.9712067	132.9499969	158.9712067	127.9732513	154.9898224	128.4709183	0	0
12-Jul-18 12:49:00	157.9758759	144.5386673	158.9712067	133.4476563	158.9712067	127.9732513	154.9898224	128.9685974	0	0
12-Jul-18 12:50:00	157.9758759	145.0363464	158.9712067	133.9453278	158.9712067	127.4755844	154.9898224	128.9685974	0	0
12-Jul-18 12:51:00	157.9758759	144.5386795	158.9712067	133.4476684	158.9712067	127.4755722	154.9898224	128.4709305	0	0
12-Jul-18 12:52:00	157.9758759	144.0410004	158.9712067	133.4476563	158.9712067	126.9779098	154.9898224	128.4709183	0	0
12-Jul-18 12:53:00	150.5108695	141.0550039	158.9712067	133.9453278	158.9712067	126.4802176	154.9898224	128.4709313	0	0
12-Jul-18 12:54:00	147.5246486	140.0595847	158.9712067	133.4476702	158.9712067	127.4755705	154.9898224	127.9732513	0	0
12-Jul-18 12:55:00	146.0317943	139.5619747	158.9712067	133.4476545	158.9712067	127.9732513	154.9898224	128.4709165	0	0
12-Jul-18 12:56:00	137.5001929	135.5094699	158.9712067	133.4476702	158.9712067	127.9732513	154.9898224	128.9685974	0	0
12-Jul-18 12:57:00	146.4581009	139.4907497	158.9712067	133.4476545	158.9712067	127.9732513	154.9898224	128.9685974	0	0
12-Jul-18 12:58:00	157.9758759	145.0363464	158.9712067	133.9453278	158.9712067	127.4755878	154.9898224	128.9685974	0	0
12-Jul-18 12:59:00	143.9702231	137.9979755	158.9712067	133.4476735	158.9712067	127.4755672	154.9898224	128.4709355	0	0
12-Jul-18 13:00:00	138.4953001	135.509351	158.9712067	132.9499969	158.9712067	127.4755894	154.9898224	128.4709132	0	0
12-Jul-18 13:01:00	152.998989	142.5479256	158.9712067	133.4476512	158.9712067	127.9732291	154.9898224	128.9685974	0	0
12-Jul-18 13:02:00	158.4735523	144.5386844	158.9712067	133.4476734	158.9712067	127.9732734	154.9898224	128.4709354	0	0
12-Jul-18 13:03:00	157.9758759	143.5433382	158.9712067	132.4523272	158.9712067	126.9779053	154.9898224	127.9732513	0	0
12-Jul-18 13:04:00	157.9758759	143.5433139	158.9712067	132.4523029	158.9712067	126.9779053	154.9898224	127.9732513	0	0
12-Jul-18 13:05:00	157.9758759	144.0410004	158.9712067	132.4523322	158.9712067	126.9779053	154.9898224	127.9732513	0	0
12-Jul-18 13:06:00	157.9758759	144.0410004	158.9712067	132.4523003	158.9712067	126.9779053	154.9898224	127.9732513	0	0
12-Jul-18 13:07:00	157.9758759	144.0410004	158.9712067	132.9499969	158.9712067	126.9779053	155.4874795	127.4755943	0	0
12-Jul-18 13:08:00	157.9758759	144.0410004	158.9712067	133.4476522	158.9712067	126.9779053	155.4875055	127.9732311	0	0
12-Jul-18 13:09:00	157.9758759	144.0410004	158.9712067	133.4476667	158.9712067	126.9779053	154.9898224	128.4709287	0	0
12-Jul-18 13:10:00	157.9758759	144.0410004	158.9712067	133.4476581	158.9712067	127.475574	154.9898224	127.9732513	0	0
12-Jul-18 13:11:00	157.9758759	144.0410004	158.9712067	133.9453278	158.9712067	127.9732513	154.9898224	127.9732513	0	0
12-Jul-18 13:12:00	151.5061671	141.5526491	158.9712067	133.4476667	158.9712067	127.9732513	154.9898224	128.4709201	0	0
12-Jul-18 13:13:00	151.5060009	142.0502497	158.9712067	132.9499969	158.9712067	127.4755868	155.4874869	128.4709329	0	0
12-Jul-18 13:14:00	150.5109549	141.5527238	158.9712067	132.9499969	158.9712067	126.9779053	155.4875081	127.9732513	0	0
12-Jul-18 13:15:00	150.5106512	141.0549166	158.9712067	132.9499969	158.9712067	127.4755707	154.9898224	127.9732513	0	0
12-Jul-18 13:16:00	157.9758759	144.0410004	158.9712067	133.4476598	158.9712067	127.9732513	154.9898224	127.9732513	0	0
12-Jul-18 13:17:00	157.9758759	144.5386709	158.9712067	133.4476649	158.9712067	127.9732513	154.9898224	127.9732513	0	0
12-Jul-18 13:18:00	157.9758759	145.0363464	158.9712067	132.9499969	158.9712067	127.9732513	154.9898224	127.9732513	0	0
12-Jul-18 13:19:00	157.9758759	145.0363464	158.9712067	133.4476549	158.9712067	127.4755858	154.9898224	128.4709169	0	0
12-Jul-18 13:20:00	140.9842873	137.0026721	158.9712067	133.4476748	158.9712067	127.4755659	154.9898224	128.4709368	0	0
12-Jul-18 16:45:00	157.9758759	145.0363464	158.9712067	133.9453278	158.9712067	127.9732513	155.4875038	128.470916	0	0
12-Jul-18 16:46:00	153.9945447	143.0456847	158.9712067	133.9453278	158.9712067	127.9732513	155.4874878	128.470932	0	0
12-Jul-18 16:47:00	153.9944232	143.0456239	158.9712067	134.4430008	158.9712067	128.4709168	155.9851685	128.4709168	0	0
12-Jul-18 16:48:00	157.9758759	145.0363464	158.9712067	134.9406891	158.9712067	128.470932	155.487503	128.9685974	0	0
12-Jul-18 16:49:00	157.9758759	145.5340171	158.9712067	134.9406891	158.9712067	128.4709144	154.9898224	128.4709344	0	0
12-Jul-18 16:50:00	157.9758759	145.5340395	158.9712067	134.9406891	158.9712067	128.9685974	155.487483	127.9732513	0	0
12-Jul-18 16:51:00	157.9758759	145.5340147	158.9712067	134.4430208	158.9712067	128.4709368	155.4875078	128.470912	0	0
12-Jul-18 16:52:00	157.9758759	146.0317078	158.9712067	133.9453278	158.9712067	127.9732513	154.9898224	128.9685974	0	0
12-Jul-18 16:53:00	157.9758759	145.5340355	158.9712067	134.4430001	158.9712067	127.9732513	154.9898224	128.9685974	0	0
12-Jul-18 16:54:00	157.9758759	145.0363464	158.9712067	134.4430127	158.9712067	128.4709201	155.4874911	127.9732599	0	0
12-Jul-18 16:55:00	157.9758759	145.0363464	158.9712067	134.4430041	158.9712067	128.4709287	155.9851685	127.475574	0	0
12-Jul-18 16:56:00	154.9898551	144.0410087	158.9712067	134.4430126	158.9712067	127.9732513	155.4874996	127.9732513	0	0
12-Jul-18 16:57:00	150.5107696	142.5479853	158.9712067	133.9453278	158.9712067	127.9732513	154.9898224	128.4709203	0	0
12-Jul-18 16:58:00	153.4967509	143.5433099	158.9712067	133.9453278	158.9712067	127.9732513	154.9898224	128.9685974	0	0
12-Jul-18 16:59:00	157.9758759	145.5340195	158.9712067	133.9453278	158.9712067	128.4709168	154.9898224	128.9685974	0	0

12-Jul-18 17:00:00	157.9758759	146.0317078	158.9712067	133.9453278	158.9712067	128.4709337	155.4874861	128.4709337	0	0
12-Jul-18 17:01:00	157.9758759	145.5340382	158.9712067	133.9453278	158.9712067	128.9685751	155.9851685	128.4709132	0	0
12-Jul-18 17:02:00	157.9758759	144.5386845	158.9712067	133.4476735	158.9712067	128.9686197	155.4875066	128.4709355	0	0
12-Jul-18 17:03:00	157.9758759	144.0410004	158.9712067	133.4476512	158.9712067	127.9732513	155.4874843	127.9732513	0	0
12-Jul-18 17:04:00	156.9805462	144.0410004	158.9712067	133.9453278	158.9712067	127.9732513	155.9851685	127.9732513	0	0
12-Jul-18 17:05:00	156.9804963	144.5386605	158.9712067	133.4476753	158.9712067	127.9732513	155.9851685	127.9732513	0	0
12-Jul-18 17:06:00	157.9758759	145.0363464	158.9712067	133.4476494	158.9712067	127.9732513	155.9851685	127.9732513	0	0
12-Jul-18 17:07:00	157.9758759	145.5340142	158.9712067	133.4476753	158.9712067	127.9732513	155.9851685	128.4709115	0	0
12-Jul-18 17:08:00	157.9758759	145.5340349	158.9712067	132.9499969	158.9712067	127.9732513	155.9851685	128.4709322	0	0
12-Jul-18 17:09:00	157.478198	144.5386762	158.9712067	133.4476596	158.9712067	127.9732513	155.9851685	127.4755811	0	0
12-Jul-18 17:10:00	157.4781924	144.5386706	158.9712067	133.9453278	158.9712067	127.9732513	155.9851685	127.4755755	0	0
12-Jul-18 17:11:00	157.9758759	145.0363464	158.9712067	133.4476651	158.9712067	127.9732513	155.9851685	127.9732513	0	0
12-Jul-18 17:12:00	157.478198	145.0363464	158.9712067	132.9499969	158.9712067	127.9732513	155.9851685	128.4709216	0	0
12-Jul-18 17:13:00	157.478189	145.0363464	158.9712067	133.4476562	158.9712067	128.4709182	155.9851685	128.9685974	0	0
12-Jul-18 17:14:00	157.9758759	144.5386829	158.9712067	133.4476718	158.9712067	128.4709339	155.9851685	128.9685974	0	0
12-Jul-18 17:15:00	157.9758759	144.5386647	158.9712067	132.9499969	158.9712067	127.9732513	155.4875042	128.9685974	0	0
12-Jul-18 17:16:00	157.9758759	145.0363464	158.9712067	133.4476543	158.9712067	127.9732513	154.9898224	128.4709325	0	0
12-Jul-18 17:17:00	157.9758759	145.534019	158.9712067	133.9453278	158.9712067	127.9732513	155.4874873	127.9732513	0	0
12-Jul-18 17:18:00	157.9758759	145.5340352	158.9712067	133.9453278	158.9712067	128.4709163	155.9851685	128.4709163	0	0
12-Jul-18 17:19:00	157.9758759	145.0363464	158.9712067	133.9453278	158.9712067	128.4709358	155.4875068	128.4709358	0	0
12-Jul-18 17:20:00	150.5109853	142.0503887	158.9712067	133.9453278	158.9712067	127.9732513	154.9898224	127.9732513	0	0
12-Jul-18 17:21:00	150.5105449	142.5478785	158.9712067	133.9453278	158.9712067	128.4709097	155.4874807	127.9732513	0	0
12-Jul-18 17:22:00	157.9758759	145.0363834	158.9712067	133.9453278	158.9712067	128.4709391	155.4875101	127.9732513	0	0
12-Jul-18 17:23:00	157.9758759	144.5386637	158.9712067	133.9453278	158.9712067	127.9732513	155.4874857	128.4709146	0	0
12-Jul-18 17:24:00	157.9758759	145.0363464	158.9712067	133.9453278	158.9712067	127.9732513	155.9851685	128.9685974	0	0
12-Jul-18 17:25:00	146.9560544	139.9885665	158.9712067	133.9453278	158.9712067	127.9732513	155.9851685	128.9685974	0	0
12-Jul-18 17:26:00	146.9558414	139.988469	158.9712067	133.9453278	158.9712067	128.4709196	155.9851685	128.9685974	0	0
12-Jul-18 17:27:00	157.9758759	144.5386782	158.9712067	133.9453278	158.9712067	127.973261	155.9851685	128.4709292	0	0
12-Jul-18 17:28:00	157.9758759	145.0363396	158.9712067	133.9453278	158.9712067	127.4755711	155.4875026	128.4709172	0	0
12-Jul-18 17:29:00	157.9758759	146.0317078	158.9712067	133.447672	158.9712067	127.9732513	155.4874858	128.470934	0	0
12-Jul-18 17:30:00	157.9758759	145.5340357	158.9712067	133.4476537	158.9712067	128.4709158	155.9851685	127.9732513	0	0
12-Jul-18 17:31:00	157.9758759	145.5340195	158.9712067	134.4430008	158.4735489	128.9685974	155.9851685	128.4709168	0	0
12-Jul-18 17:32:00	157.9758759	145.5340347	158.9712067	134.443016	158.4735337	128.470932	155.487503	128.470932	0	0
12-Jul-18 17:33:00	157.9758759	145.0363464	158.9712067	133.9453278	158.9712067	127.9732513	155.4874878	128.4709168	0	0
12-Jul-18 17:34:00	157.9758759	144.5386834	158.9712067	133.4476724	158.9712067	128.4709144	155.9851685	128.4709344	0	0
12-Jul-18 17:35:00	157.9758759	144.0410004	158.9712067	132.9499969	158.9712067	127.9732761	155.4875078	127.9732513	0	0
12-Jul-18 17:36:00	157.9758759	144.0410004	158.9712067	132.9499969	158.9712067	127.4755659	155.487483	127.4755907	0	0
12-Jul-18 17:37:00	157.9758759	144.538661	158.9712067	133.44765	158.9712067	127.9732513	155.9851685	127.9732265	0	0
12-Jul-18 17:38:00	157.9758759	144.53868	158.9712067	133.4476689	158.9712067	127.9732513	155.9851685	128.470931	0	0
12-Jul-18 17:39:00	157.9758759	144.0410004	158.9712067	133.4476616	158.9712067	127.9732513	155.9851685	127.9732513	0	0
12-Jul-18 17:40:00	150.5107765	141.0549667	158.9712067	133.9453278	158.9712067	127.9732513	155.9851685	127.9732513	0	0
12-Jul-18 17:41:00	150.5107537	141.0549576	158.9712067	133.4476631	158.9712067	127.9732513	155.9851685	127.9732513	0	0
12-Jul-18 17:42:00	157.9758759	144.5386726	158.9712067	133.4476616	158.9712067	127.9732513	155.4874962	127.9732513	0	0
12-Jul-18 17:43:00	157.9758759	145.0363464	158.9712067	133.4476682	158.9712067	127.9732513	155.4874896	127.9732513	0	0
12-Jul-18 17:44:00	157.9758759	145.0363464	158.9712067	132.9499969	158.9712067	128.4709135	155.4875063	127.9732513	0	0
12-Jul-18 17:45:00	157.9758759	144.5386852	158.9712067	133.4476506	158.9712067	127.9732749	155.4874837	127.9732513	0	0
12-Jul-18 17:46:00	148.022653	139.9886132	158.9712067	133.9453278	158.9712067	127.4755657	155.9851685	127.9732513	0	0
12-Jul-18 17:47:00	148.0221468	140.4860675	158.9712067	133.447675	158.9712067	127.9732513	155.9851685	128.4709117	0	0
12-Jul-18 17:48:00	157.9758759	145.0363464	158.9712067	132.9499969	158.9712067	127.9732513	155.4875081	128.470937	0	0
12-Jul-18 17:49:00	157.9758759	145.0363464	158.9712067	133.4476505	158.9712067	127.9732513	155.4874835	127.9732513	0	0
12-Jul-18 17:50:00	157.9758759	145.0363464	158.9712067	133.9453278	158.9712067	127.9732513	155.4875066	127.9732513	0	0
12-Jul-18 17:51:00	147.5249531	140.486285	158.9712067	133.9453278	158.9712067	127.9732513	155.4874843	128.4709132	0	0
12-Jul-18 17:52:00	147.5244853	140.4860813	158.9712067	133.9453278	158.9712067	127.9732513	155.4875066	128.9685974	0	0
12-Jul-18 17:53:00	157.9758759	145.0363464	158.9712067	133.9453278	158.9712067	127.9732513	154.9898224	128.9685974	0	0
12-Jul-18 17:54:00	157.9758759	145.0363464	158.9712067	133.9453278	158.9712067	127.9732513	154.9898224	128.9685974	0	0
12-Jul-18 17:55:00	157.9758759	144.5386744	158.9712067	133.9453278	158.9712067	127.9732513	154.9898224	128.4709254	0	0
12-Jul-18 17:56:00	157.9758759	144.5386724	158.9712067	133.9453278	158.9712067	128.4709234	154.9898224	128.4709234	0	0
12-Jul-18 17:57:00	157.9758759	145.0363464	158.9712067	133.9453278	158.9712067	128.4709254	155.4874944	128.4709254	0	0
12-Jul-18 17:58:00	157.9758759	145.0363464	158.9712067	133.9453278	158.9712067	127.4755844	155.9851685	127.9732513	0	0
12-Jul-18 17:59:00	152.5015797	142.548037	158.9712067	133.9453278	158.9712067	127.4755672	155.9851685	127.9732513	0	0
12-Jul-18 18:00:00	152.5013444	142.54793	158.9712067	133.9453278	158.9712067	127.4755886	155.9851685	128.4709141	0	0
12-Jul-18 18:01:00	157.9758759	145.0363464	158.9712067	133.9453278	158.9712067	127.9732326	155.4875048	128.9685974	0	0
12-Jul-18 18:02:00	157.9758759	145.0363464	158.9712067	133.4476717	158.9712067	128.4709337	154.9898224	128.9685974	0	0
12-Jul-18 18:03:00	157.9758759	145.0363464	158.9712067	133.447653	158.9712067	127.9732513	154.9898224	128.4709337	0	0
12-Jul-18 18:04:00	157.9758759	145.0363464	158.9712067	133.9453278	158.9712067	127.4755902	154.9898224	127.9732513	0	0
12-Jul-18 18:05:00	157.9758759	145.0363464	158.9712067	133.4476768	158.9712067	127.4755639	155.487481	127.9732513	0	0
12-Jul-18 18:06:00	157.9758759	144.5386878	158.9712067	133.4476479	158.9712067	127.9732513	155.4875099	127.9732513	0	0
12-Jul-18 18:07:00	157.9758759	144.538659	158.9712067	134.442994	158.9712067	127.9732513	154.9898224	127.9732513	0	0
12-Jul-18 18:08:00	157.9758759	145.0363464	158.9712067	134.443017	158.9712067	127.9732513	154.9898224	127.9732513	0	0
12-Jul-18 18:09:00	157.9758759	145.5340243	158.9712067	133.9453278	158.9712067	127.9732513	154.9898224	127.9732513	0	0
12-Jul-18 18:10:00	157.9758759	145.5340299	158.9712067	133.9453278	158.9712067	127.9732513	155.4874926	127.9732513	0	0
12-Jul-18 18:11:00	157.9758759	145.0363464	158.9712067	133.9453278	158.9712067	128.9685918	155.4874982	127.9732513	0	0
12-Jul-18 18:12:00	157.9758759	145.0363464	158.473544	133.4476651	158.9712067	128.968603	155.4874926	127.9732513	0	0
12-Jul-18 18:13:00	157.9758759	145.0363464	158.4735343	133.4476554	158.9712067	127.9732513	155.4875024	128.4709174	0	0
12-Jul-18 18:14:00	157.4782063	145.0363464	158.9712067	133.4476735	158.9712067	127.9732513	154.9898224	128.4709355	0	0
12-Jul-18 18:15:00	157.4781858	144.5386828	158.9712067	133.9453243	158.9712067	128.470915	155.4874861	128.470915	0	0
12-Jul-18 18:16:00	145.4631273	139.4909142	158.9712067	134.443016	158.9712067	128.9685974	155.487503	128.9685974	0	0
12-Jul-18 18:17:00	145.4627455	139.9884407	158.9712067	133.9453278	158.9712067	128.470932	154.9898224	128.470932	0	0
12-Jul-18 18:18:00	157.9758759	145.0363464	158.9712067	133.9453278	158.9712067	127.4755859	155.4874878	127.9732513	0	0
12-Jul-18 18:19:00	157.4782052	144.5386834	158.9712067	133.4476724	158.9712067	126.9779053	155.4875054	128.4709144	0	0
12-Jul-18 18:20:00	157.4781828	144.538661	158.9712067	133.44765	158.9712067	127.4755659	154.9898224	128.9685974	0	0
12-Jul-18 18:21:00	157.9758759	144.5386858	158.9712067	133.4476748	158.9712067	128.470912	155.487483	128.9685974	0	0
12-Jul-18 18:22:00	157.9758759	144.538661	158.9712067	133.44765	158.9712067	128.4709368	155.4875078	128.9685974	0	0
12-Jul-18 18:23:00	157.9758759	145.0363464	158.9712067	133.9453278	158.9712067	128.4709153	154.9898224	128.4709335	0	0
12-Jul-18 18:24:00	157.9758759	145.0363464	158.9712067	133.9453278	158.9712067	128.4709302	154.9898224	127.9732513	0	0
12-Jul-18 18:25:00	157.9758759	145.0363464	158.9712067	133.9453278	158.9712067	127.9732513	155.4874896	127.9732513	0	0
12-Jul-18 18:26:00	157.9758759	145.0363464	158.9712067	133.4476682	158.9712067	127.9732513	155.4875012	128.4709186	0	0
12-Jul-18 18:27:00	147.5248415	141.0550011	158.9712067	133.4476565	158.9712067	127.9732513	154.9898224	128.9685974	0	0
12-Jul-18 18:28:00	144.5385614	140.0595637	158.9712067	133.9453278	158.9712067	128.4709169	154.9898224	128.9685974	0	0
12-Jul-18 18:29:00	154.9897753	144.5386537	158.9712067	133.9453278	158.9712067	128.4709335	155.4874863	128.9685974	0	0
12-Jul-18 18:30:00	157.9758759	145.0363708	158.9712067	133.4476707	158.9712067	127.9732513	155.4875038	128.9685974	0	0

Chapter 5 Particulates

5.1 Introduction

Emissions of ash and other solid particles from power plants and other industrial activities were the first that called for action. There are several reasons for that. First, since down to a size of a few micron particles (or droplets) can be seen by the naked eye, the problems could not have remained unnoticed. Secondly, the emissions produce a hazard much closer to the source than gaseous pollutants do: material is deposited within a shorter range. As a first response to this, high stacks have been erected worldwide. A third reason is that the amount of dust that may be emitted from, for example, a coal-fired power plant, per unit output power is much higher than for other pollutants. This is simply because the amount of ash-forming material in coals is much larger than the amount of sulphur, nitrogen *etc.*, being typically 10-20 %-wt (dry). This, in combination with the fact that large-scale use of coal as an energy source was about fifty years ahead of oil and gas explains why dust emissions from coal-fired power plants have been controlled since the 1920s (7 chapter 2). Electrostatic precipitators or ESPs (L section 5.7), still a leading technology in this field, were applied for this purpose almost exclusively in these days: efficiencies have increased from ~ 90% to ~ 99% since then (Klingspor and Vernon, 1988).

During the last decades the maximum allowable emissions of particulates have decreased, for coal firing in western Europe, from 150 - 200 mg/m^3_{STP} in the 1980s to typically 50 mg/m^3_{STP} in the 1990s, with 20 mg/m^3_{STP} as the limit for the near future for units larger than 300 - 500 $MW_{thermal}$. Although the environment and health-related issues are the most important motivations for the control of particulate emissions several other factors contribute to the picture. As the other chapters demonstrate, other pollutants have to be controlled as well and the technologies applied for that do not allow for high loads of fly ash or other condensed matter in the gas to be treated. More recently, the coming-of-age of integrated processes based on pressurised fluidised bed combustion and coal gasification with combined cycle power generation (PFBC-CC and IGCC) presented the problem of hot (and pressurised) gas clean-up for dust. Modern expansion turbines applied there do not allow for turbine inlet dust concentrations higher than a few ppmw, with additional requirements for particles larger than 10 μm and 2 μm. This maximum dust load is less than $1/10^{th}$ of a typical allowable emission to the environment (Stringer and

Meadowcroft, 1990, Mitchell, 1997).

Two other reasons for dust control measures are not specific for power plants or energy-related processes: in some processes the "dust" is in fact a (valuable) product or an expensive catalyst, whilst in all cases the risk for dust explosions is reduced when particulates are not left uncontrolled.

Fuels do not contain ash as such. During combustion or gasification inorganic mineral impurities in fuels are converted into solid, liquid and gaseous compounds, which finally leave the system as bottom ashes, fly ashes or vapour. Due to condensation and other processes some vapours solidify, whilst others may pass the entire emissions control system and leave via the stack. An example for the latter is mercury (Hg), of which 50% or more of the input is emitted to the environment (**L** chapter 8). For a generalised pulverised coal combustion system (dry bottom firing, with an ESP for dust control and conventional wet FGD, **7** chapter 3), a typical distribution of ashes and other solid residues streams is given in Figure 5.1

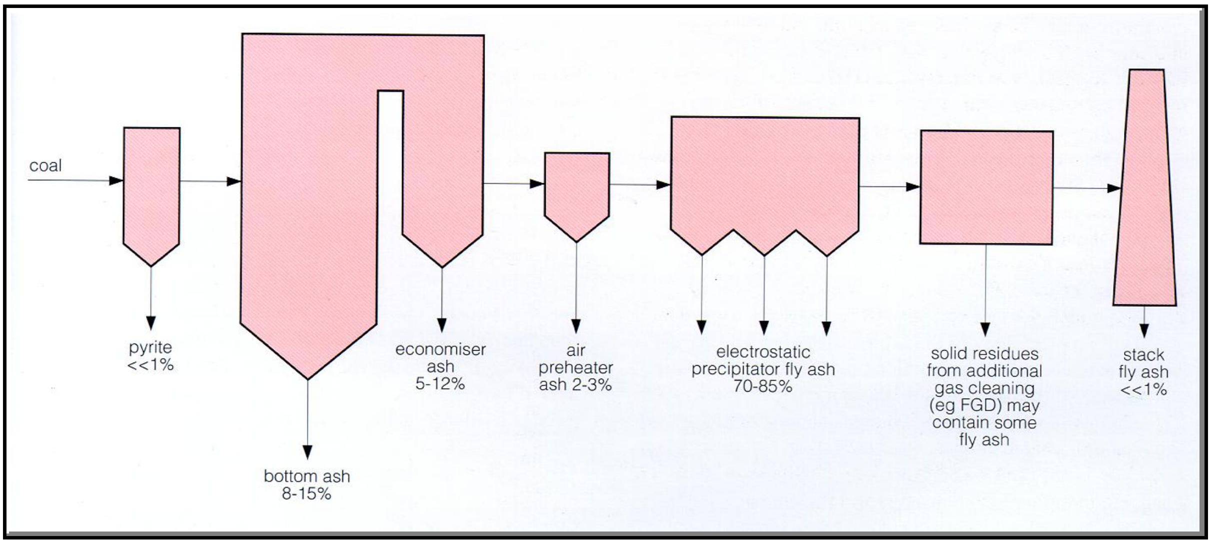


Figure 5.1 Typical distribution of ashes and solid residues streams from a general pulverised coal combustion unit (picture from Carpenter, 1998)

Into what form the ash-forming material will finally be converted depends on many factors, such as temperature, surrounding gas atmosphere (combustion or gasification), pressure, fuel particle size, fuel particle size distribution, residence time, *etc.*, some of which are dictated by process type and furnace design. It must be noted that for solid fuel-based processes the furnace design is to a very large extent pre-determined by how the ashes are expected to behave inside the unit and how and where to remove them, as bottom ashes or fly ashes. Many operation and maintenance problems with solid fuel-fired systems are related to the behaviour of the ashes, both during and after their formation. Most important here is deterioration of system components by corrosion *etc.* and water-tube failures that eventually enforce a total system shut-down. An extensive overview of the effects of ash-forming components on furnace and boiler operation was given not too long ago by Bryers (1996) for fossil fuels, biomass and waste-derived fuels.

Knowledge and understanding of ash-related issues in relation to combustion and gasification processes is largely based on a long experience with coal and peat. With these fuels the ashes formed are mainly composed of oxides of silicon, aluminum and iron (SiO_2, Al_2O_3 and Fe_2O_3). Small amounts of alkali metals present are bound to sulphates since an excess amount of sulphur is introduced with the fuel as well. This general knowledge is of limited use when considering the alternative, renewable fuels that currently penetrate the energy market, such as biomass and waste-derived fuels. Despite the fact that biomass contains very little ash (typically less than 0.5 %-wt dry), the chemical characteristics of these “new” fuels makes them rather troublesome in comparison with coal. High levels of potassium and often also chlorine, in combination with a sulphur content near zero have presented a completely new set of problems related to boiler and furnace operation and maintenance.

A feature of ashes and particulate solids in general is that they possess a particle size distribution and have a certain shape that may be close to spherical or far from that. For a general dry bottom pulverised coal combustion unit typical particle size distributions of bottom ashes and fly ashes as captured by the ESP are shown in Figure 5.2. Note that the incoming fuel particle size is typically 90%-wt below 100 μm for pulverised coal firing. Figure 5.2 gives a volume based distribution which is closely related to a mass distribution. Alternatively a number, length (diameter), or surface distribution can be used, depending on the measurement technique that is applied.

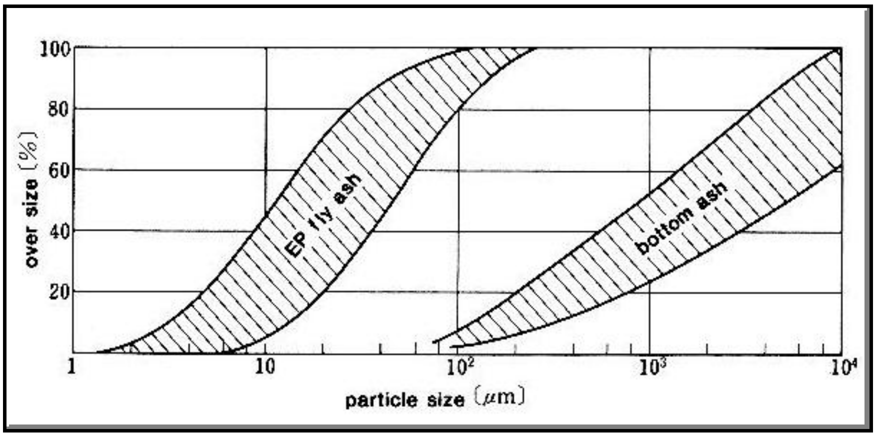


Figure 5.2 Typical volume-based cumulative size distributions for pulverised coal combustion fly ash and bottom ash. EP = electrostatic precipitator (picture from Iinoya *et al.*, 1991)

For modelling purposes log-normal, Rosin-Rammler-Sperling or Gates-Gaudin-Schumann distributions are generally used, all three based on two statistical parameters. The non-spherical shape of a particle can be quantified by a single quantity such as the (Wadell) sphericity, ψ, using a perfect sphere as a reference:

$$\psi = 4.836 \frac{(\ volume\ of\ \ particle\ )^{\frac{2}{3}}}{surface\ of\ \ particle} = \frac{surface\ of\ \ sphere\ with\ same\ volume}{surface\ of\ \ particle} \tag{5-1}$$

For a spherical particle, ψ = 1, for a cube ψ = 0.81, for coal powder ψ = 0.65-0.75 (Kunii and Levenspiel, 1991).

It is obvious that the removal of particles or droplets from a gas requires some understanding of what is generally known as "aerosol technology". Some of that will be mixed into this chapter. An aerosol is a suspension of solid or liquid particles in a gas, with particle sizes ranging from 0.001 to over 100 μm (Hinds, 1982). More details on solids handling, aerosols and particle technology in general can be found elsewhere (Iinoya *et al.*, 1991, Hinds, 1982, Zevenhoven and Heiskanen, 2000).

Considering the health risks presented by dust emissions from power plants the classifications PM_{10} (particulate matter finer than 10 μm) and $PM_{2.5}$ (particulate matter finer than 2.5 μm) are widely used. The $PM_{2.5}$ standard for ambient air quality was presented in 1997 by the US EPA as an addition to the PM_{10} standard, recognising that the differences in chemical composition and physical behaviour make the two size classes very different from an environmental impact and health hazard point of view. For Europe, a standard for $PM_{2.5}$ has been proposed for 2005 (Sloss and Smith, 1998). $PM_{2.5}$ class particles are a problem for the human respiratory system. The nose/mouth/throat system can't prevent the particles from entering the lungs; they can't be removed from lung tissue by the blood circulation either.

PM_{10} and $PM_{2.5}$ particulate matter as generated by human activities may be of the same order as what is produced by natural processes (sand and soil dispersion, sea salt, volcanoes). It is estimated that ⅓ of the PM_{10} comes from coal combustion, road transport is considered to be a more serious pollutant (diesel engines, leaded gasoline). In the US, 45% of $PM_{2.5}$ is connected to fossil fuel combustion. For a coal fired unit with ESP or baghouse filter the emissions will be in the finer PM_{10} range, being of the order $PM_{3.5}$ when a wet FGD scrubber is present, approaching $PM_{1.0}$ for the most efficient plant (Sloss and Smith 1998). One feature of $PM_{2.5}$ is that significant amounts of it are formed as so-called secondary particles. Sulphate and nitrate aerosols are produced by processes taking place in the atmosphere, whilst fragmentation of PM_{10}

particles adds to the $PM_{2.5}$ fraction as well. Clearly the problem goes far beyond controlling PM_{10} and $PM_{2.5}$ emissions from combustion and gasification facilities.

In this chapter the various methods to remove particulate matter, mainly fly ash, from combustion flue gases and gasification product gases will be dealt with. Following a short analysis of how ashes are generated and how they are correlated with ash-forming matter in the fuel, some emission standards for fly ash emissions are given. Starting with the largest particle size fraction, gravity settling and gas cyclones are discussed first. This is followed by the two most important technologies, being electrostatic precipitation (ESP), and baghouse/barrier filters, respectively. Then a short discussion on wet scrubbing is presented. After that the special problem of high temperature, higher pressure (HTHP) gas clean-up for particles is addressed. The chapter ends with a few words on particulate emissions from vehicles.

It is noted that organic particulate emissions such as tar and soot are not included in this chapter (**L** chapter 6).

5.2 Ash-forming elements in fuels

As stated above, fuels do not contain ash as such. Apart from the combustible hydrocarbon part many inorganic mineral impurities are integrated within or mixed with the fuel: upon combustion or gasification this material will be oxidised to by-products of the process. Often this material can be put to further use, as is the case with fly ashes collected from the flue gas of a pulverised coal combustion facility (Sloss and Smith, 1996).

Geologically old fossil fuels contain highly integrated ash-forming matter. For low-grade coals and lignites a significant amount of that can be removed before further processing. Especially for steel processing application it is necessary to reduce the amount of ash-forming material ("coal washing"), or when the amount of that material is excessive, such as 50%-wt or more in lignites from India or Greece. In Germany, almost all (brown) coals are washed before firing. Waste-derived fuels and biomass fuels contain associated material that is only loosely bound to the combustible part of the fuel. Significant amounts of KCl (potassium chloride) can be removed from straw, for example, by simply washing with water. Pieces of metals such as iron and aluminum are easily removed from waste-derived fuels by magnetic and eddy current-based methods.

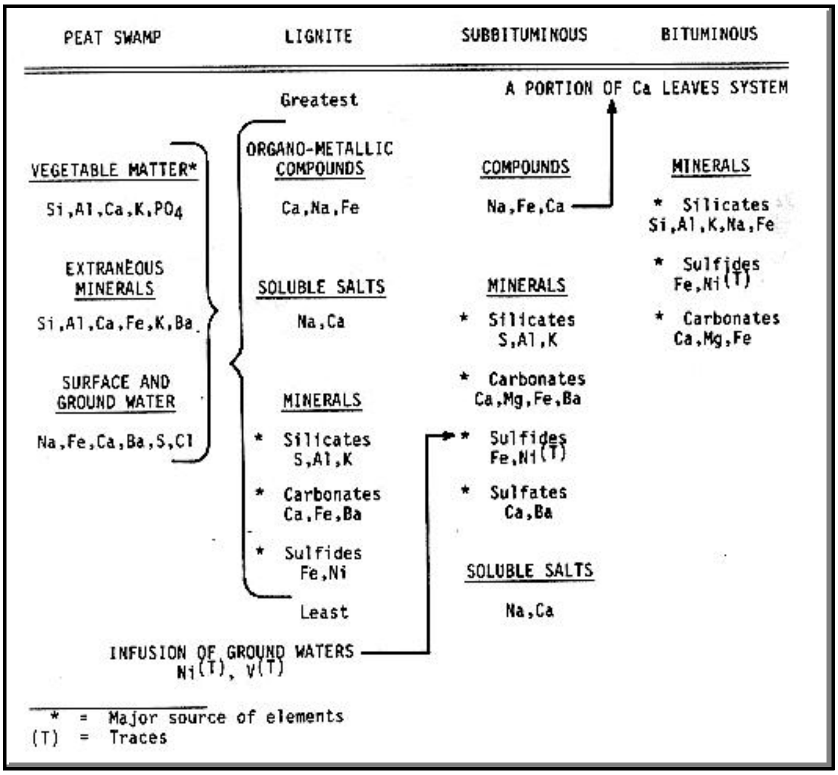


Figure 5.3 Transformation of mineral matter during coalification (picture from Bryers, 1996).

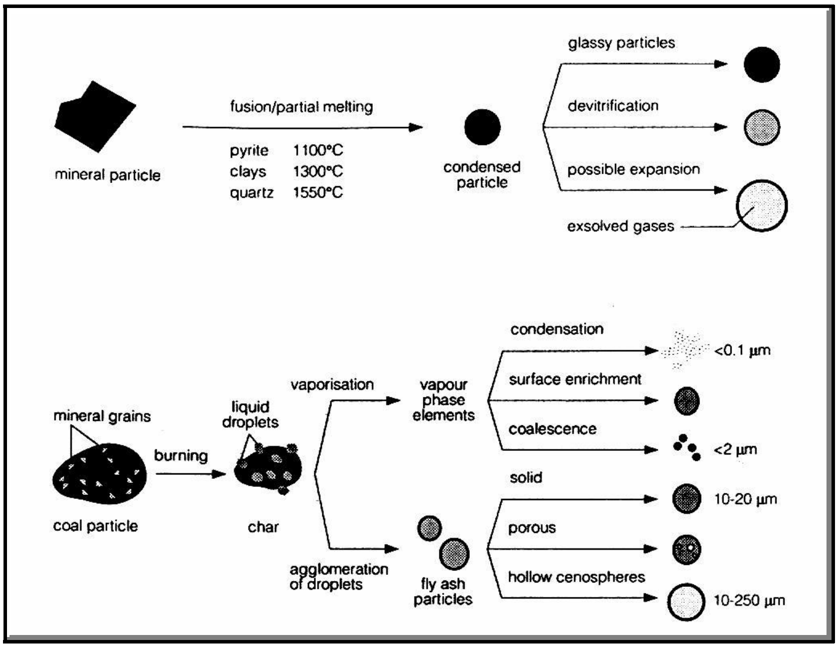


Figure 5.4 Interactions between mineral impurities during coal combustion (picture from Sloss *et al.*, 1996).

Figure 5.3 gives a schematic summary on how minerals slowly but surely become part of the coal during the coalification process. Silicates, sulphides (pyrite) and carbonates are the result of interactions between deteriorating organic material, extraneous minerals and surface and ground water.

Nonetheless, the ash-forming matter is present in the fuel in two forms: as discrete particles and as inclusions of the combustible matrix. The implications this has for the combustion or gasification process is illustrated by Figure 5.4. Discrete mineral particles are quickly isolated, and melting at high temperatures is followed by condensation during cooling after leaving the furnace. Included minerals, however, become more and more concentrated in the fuel matrix as the connecting hydrocarbon is consumed. Metal oxides may also be reduced by the carbon, and can be released as elemental metal vapour.

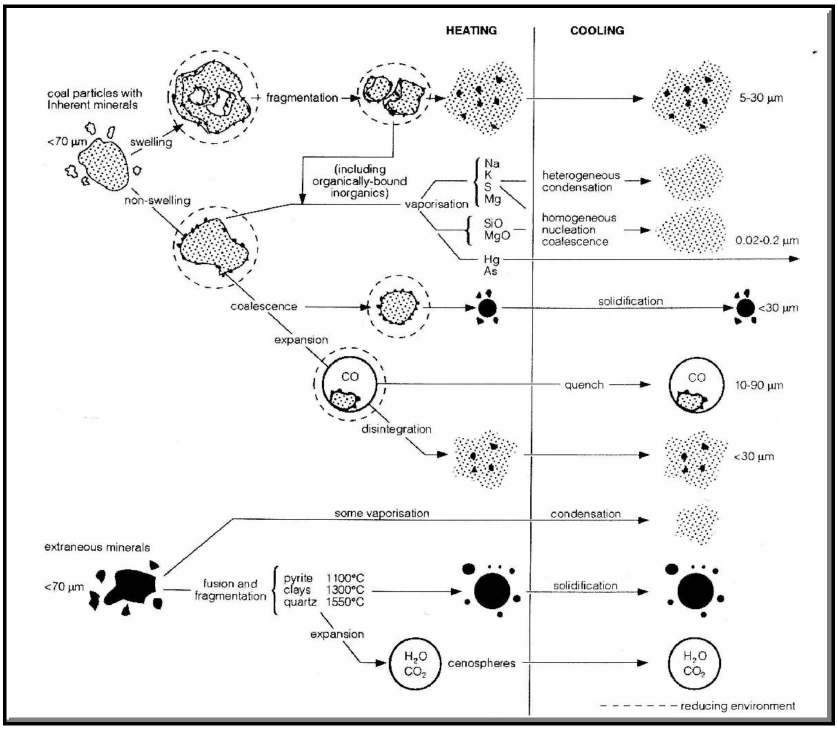


Figure 5.5 Ash formation in a pulverised coal combustor (picture from Couch, 1995)

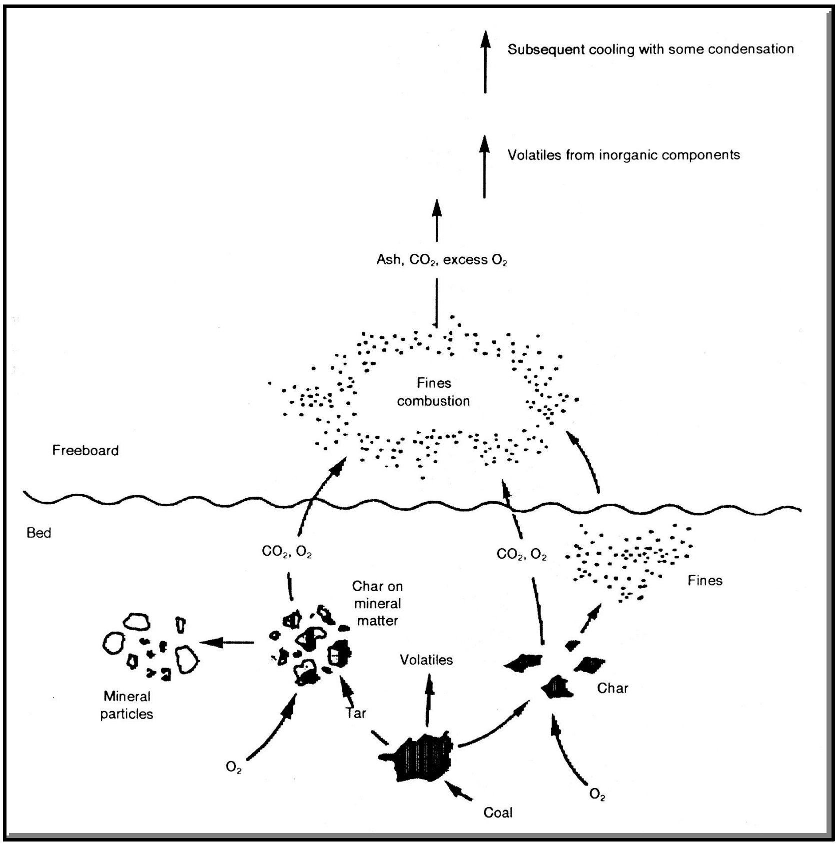


Figure 5.6 Ash formation during bubbling fluidised bed combustion (picture from Couch, 1995)

In the gas phase these can be oxidised again, followed by some clustering and coalescence, forming a significant part of what may be eventually emitted as $PM_{2.5}$. Non-combustibles that are not vaporised will form the major part of the fly ash particles to be collected by the dust control system. Figure 5.5 shows with somewhat more detail the influences of temperature and changing particle size on the formation of ash particles ranging from 0.01 : m to more than 100 : m.

During gasification a different picture is seen that can be explained when considering the reducing gas atmosphere. The reduction of metal oxides to elemental metal (with a much lower boiling point) is much stronger, and re-oxidation and clustering of the oxide particles does not occur.

Something similar is seen when the chlorine content of the fuel is high (*i.e.* > 0.1 %-wt dry). In that case the metal oxides are transformed to chlorides with a much lower boiling point, followed by vaporisation. At lower temperatures these chlorides may react with water to metal oxides and HCl.

During fluidised bed combustion the fate of ash-forming material is very much different from what happens during pulverised fuel firing. Temperatures are much lower and particles are larger, but mechanical stresses are stronger due to strong turbulence and many impacts between particles. Fines are produced due to attrition and abrasion but much ash-forming material remains in the bed. This is illustrated in Figure 5.6. For a circulating fluidised somewhat more fly ash is formed due to the higher velocities and smaller fuel particle size.

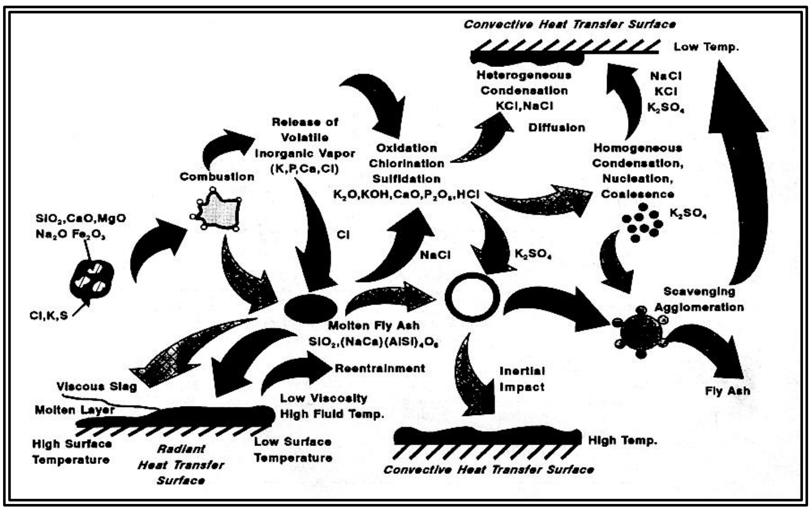


Figure 5.7 Behaviour of ash-forming matter in biomass fuels (picture from Bryers, 1996)

Biomass fuels typically produce ashes that contain 5-10 %-wt potassium, 20%-wt or more calcium (ash from wood, though, may contain 70 %-wt $CaO+CaCO_3$) and not much more than 10%-wt silica. The ash chemistry is in this case determined by species such as KOH, NaOH, KCl, NaCl, K_2SO_4, Na_2SO_4 and SiO_2, as illustrated by Figure 5.7.The ashes and deposits formed may have first melting points lower than 600**E**C, giving sticky deposits and/or defluidisation when biomass is fired in a fluidised bed. Also with these fuels the volatility of the ash-forming elements is higher with gasification than during combustion.

For the inorganic particles that are produced by coal combustion Sarofim and Helble (1993) give a rough procedure for calculating ash particle size. The largest fraction lies in the size range 1 - 30 μm, and is formed by coalescence of included minerals as described above. Assuming that one ash particle is formed per fuel particle, given that the average fuel particle size is d_f (m), the ash content is f_a (kg/kg dry fuel) and the densities of the fuel and ash particles are ρ_f and ρ_a (kg/m³), respectively, average fly ash particle size is approximately $d_a \sim (f_a\rho_f/\rho_a)^{1/3}d_f$. (For d_f = 50 μm, ρ_f/ρ_a = 0.5 and

f_a = 0.1 kg/kg, it is found that d_a ~ 18.4 μm). In addition submicron fume is formed due to vaporisation and condensation of mineral constituents, typically up to 6% of the total ash stream that leaves the furnace with the flue gas (Sarofim and Helble, 1993).

It is clear that a concept such as the "ash content" of a fuel is not easily related to the formation of bottom ashes and fly ashes during combustion or gasification as a pulverised fuel, or in a fluidised bed. Nevertheless, standard tests do exist, such as DIN and ASTM procedures (DIN, 1978), where a fuel is heated up in air under certain specific conditions. For biomass fuels, maximum test temperatures are typically a few hundred degrees lower than for coal in order to avoid loss of alkali by vaporisation. Typical values for ash contents obtained by these procedures are given in Table 5.1.

Table 5.1 Typical values for the ash content of fuels (dry %-wt)

Fossil fuels		**Biomasses & waste derived fuels**	
Coal, lignite	5 - 40	Wood	0.1 - 0.5
		Bark	2 - 8
Oil	< 0.1	Straw	4 - 8
Natural gas	-		
Light fuel oil	< 0.01	Sewage sludge	15 - 20
Heavy fuel oil	~ 0.04	Car tyre scrap	5 - 8
		Munical solid waste (MSW)	5 - 25
		Refuse derived fuel (RDF)	10 - 25
Peat	4 - 10	Packaging derived fuel (PDF)	5 - 15
		Auto shredder residue (ASR)	~ 25
Petroleum coke, "petcoke"	~1	Leather waste	~ 5
Estonian oil shale	~ 40		
Orimulsion™	~ 1.5	Black liquor solids	30 - 40

The composition of these ashes varies strongly between the fuels, although SiO_2, Al_2O_3, Fe_2O_3 and CaO are usually the primary components. Ash from fuel oils contains vanadium (V) and nickel (Ni), plus magnesium (Mg) which is added to the fuel as a corrosion inhibitor. Biomass ashes contain typically 5-10 % potassium (K) (Bryers, 1996). Ash from petcoke contains significant amounts of iron, vanadium and nickel (Anthony, 1995). Special ashes such as ash from leather waste combustion may contain close to 90 %-wt Cr_2O_3 (Cabanillas *et al.*, 1999).

The content of ash-forming matter in a solid fuel may easily be of the order of 10-20 %-wt (dry). The amounts of material that have to be handled for a typical power plant will therefore be significant and require a transport system by road, rail or water. This is illustrated by some numbers from a US power plant in Table 5.2.

***Table 5.2 Production of ashes from western US coal combustion in a 500 MW_{elec} pulverised coal power plant** (taken from Carpenter, 1998)*

	Bituminous	Wyoming Powder River Basin	Montana Powder River Basin
Coal ash content, %-wt	9.5	4.8	3.7
Bottom ash, ton/year	24560	17280	8600
Fly ash, ton/year	98260	69100	34390
Total ash, ton/year	122820	86380	42990

5.3 Particulate emission standards

For coal (and peat) combustion, SO_2 emission standards for Finland (1997) and the European Community (1988) are given in Tables 5.3 and 5.4.

Table 5.3 Particulate emission standards for Finland (1997)

Type of plant	New / Existing	Plant size (MW_{th})	Emission standard (mg/m^3_{STP} dry 6% O_2)	Comments
Combustion plant lignite, peat, wood, straw	New	1-5	540	Guideline
Combustion plant lignite, peat, wood, straw	New	5-50	(248-11*P)/3	Guideline, P=plant size in MWth
Utility, hard coal	New	1-5	405	Guideline
Utility, hard coal	New	5-50	172-2.1*P	Guideline, P=plant size in MWth
Utility, hard coal	New	50-300	50	Guideline
Utility, hard coal	New	> 300	30	Guideline
Utility, hard coal	Existing	all	see comments	Guideline for new plant used as target for existing plants

Table 5.4 Particulate emission standards for the European Community (1988)

Type of plant	New / Existing	Plant size (MW_{th})	Emission standard (mg/m^3_{STP} dry 6% O_2)	Comments
Combustion, coal	New *	50-500	100	
Combustion, coal	New *	> 500	50	

* construction licence after July 1 1988

The World Bank suggests a worldwide emission limit for all new coal-fired units of 50 mg/m^3_{STP} (dry) @ 6 % O_2, or, if that is impossible, 99.9% removal efficiency (Soud and Mitchell, 1997, McConville, 1997).

For waste firing, the particulate emission standard for Finland (as of 1.8.1994) is 10 mg/m^3_{STP} (dry) @ 10 % O_2 (Finland, 1994). This value is also the current daily-mean emission standard for the EU15 countries. For cement plants the Finnish emission standard as of 1.1.2001 is 50 mg/m^3_{STP} (dry) @ 10 % O_2, the European Commission has proposed a future standard of 30 mg/m^3_{STP} (dry) @ 10 % O_2.

5.4 Options for particulate emissions control

Selecting the most suitable device for the removal of particles from a gas stream depends on many things, partly determined by the process *i.e.* gas stream, partly determined by the particles that are to be removed. A summary of the most important factors that are to be considered is given in Table 5.5. When high temperature, high pressure (HTHP) gas clean-up is required (**L** section 5.11) the range of possible options is more narrow than when an atmospheric process is needed that operates below 200**E**C. Another important factor is size: filters are available from very small sizes (consider a sigarette filter) to large baghouse units with hundreds of separate filter bags. Electrostatic precipitators (ESPs), on the other hand, cannot be operated economically in flue gases of power units smaller than a few $MW_{thermal}$.

Size and size distribution are the most important particle-related factors, followed by their physical and chemical properties: the particles should not destroy the control device, but they should not be "invisible" to the control device either. Low sulphur coal, for example, can produce ashes that do not allow for sufficient electrostatic charging, making these particles hard to handle by an ESP.

Table 5.5 Process- and particle-dependent factors for selecting a particulate control device

Process-dependent factors	Particle-dependent factors
Gas flow volume	Particle size and size distribution
Temperature	Shape of the particles
Pressure	Surface properties
Composition of the gas	Chemical stability
Concentration of particles in the gas	Mechanical strength *etc.*, physical properties
	Chemical composition: carbon, alkali, tar, sulphur content
	(First) melting point, softening point

All this has to be related to the final objective, which is reducing the particle concentration to a certain level, with additional specifications for the outlet particle size distribution. For coal combustion by different methods the typical uncontrolled emissions and the required control efficiencies for obtaining a certain maximum outlet concentration are given in Table 5.6. Cyclone firing gives relatively low fly ash emissions, with a relative small size, though, while stoker (*i.e.* grate) firing gives somewhat higher emissions, at a relatively wide particle size distribution. The highest emissions are generated by pulverised coal units. Altogether, for a typical emission standard of 50 mg/m^3_{STP} the efficiency of the control system has to be of the order 95 - 99%.

Table 5.6 Particulate control efficiencies required for a certain controlled emission (in %) for various coal-fired boilers *(taken from Klingspor and Vernon, 1988)*

	Uncontrolled emissions	Controlled emission limits			
Boiler configuration	g/m³	50 mg/m³	100 mg/m³	200 mg/m³	500 mg/m³
Pulverised coal	8–20	99.37–99.75	98.75–99.50	97.50–99.00	93.75–97.50
Spreader stoker	2–5	99.00–99.50	95.00–98.00	90.00–96.00	75.00–90.00
Chain grate stoker	1–3	95.00–98.30	90.00–96.70	80.00–93.33	50.00–83.33
Cyclone	0.5–1.5	90.00–96.67	80.00–93.33	60.00–87.67	0.00–66.67

Finally, it is noted that different devices operate in different particle size ranges. This is a result of the physics that lies behind the method by which the particles are manipulated and eventually removed from the gas stream. As illustrated by Figure 5.8, these can be separated in processes where an external force is applied to the particle and processes where the gas stream is forced through a barrier that cannot be passed by the dispersed particles, in the form of holes smaller than the particles, or a droplet cloud.

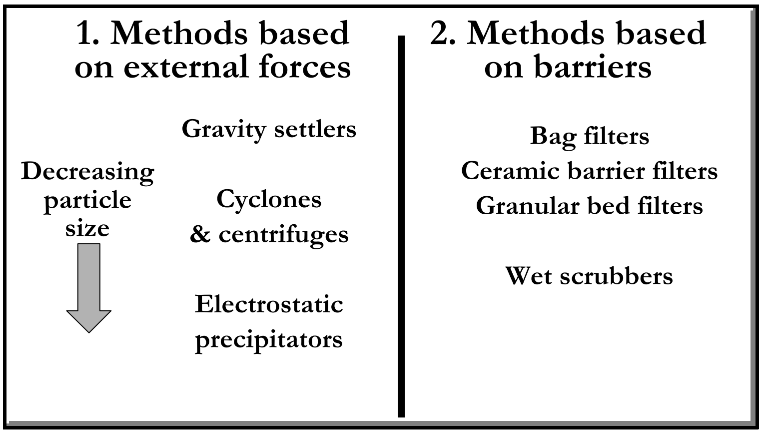


Figure 5.8 General classification of particulate control devices

Table 5.7 Collection efficiencies (in %) of several particulate control devices (table from Soud, 1995)

Control device	Removal efficiency			
	<1 μm	1–3 μm	3–10 μm	>10 μm
High efficiency ESP	96.5	98.25	99.1	99.5
Fabric filter	100	99.75	>99.95	>99.95
Venturi scrubber	>70	99.5	>99.8	>99.8
Multicyclones	11	54	85	95

For a few types of particulate control device the removal efficiencies are given for four particle size ranges in Table 5.7. For larger particles (> 10 μm) gravity and centrifugal forces can be effective, for fine particles (< 2 μm) an electrostatic force can be applied, in combination with particle charging. Venturi scrubbers operate down to a few micrometer, whilst filters offer very high efficiencies over wide size ranges. This comparison already shows the large potential of filter systems: they give high removal efficiencies over wide size ranges and they are more flexible than other method when considering the properties of the particles and the process conditions. A drawback is that relatively low gas velocities must be used, which directly translates to large filtration surface and inherently high costs.

In the remainder of this chapter the various methods are discussed, based on Figure 5.8. High temperature/high pressure methods (HTHP) receive special attention.

5.5 Gravity settlers

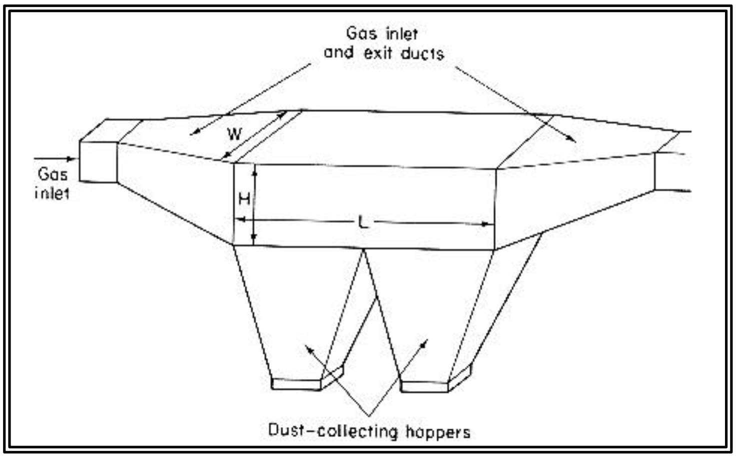


Figure 5.9 Typical lay-out of a gravity settler (picture from Flagan and Seinfeld, 1988)

Large particles, with sizes ranging from 50 μm to more than 1 mm may be successfully removed by a gravity settler, as shown in Figure 5.9. As a result of a sudden widening of the flue gas channel the gas velocity is reduced, which increases the response of the particles in the gas stream to gravity. This will induce a downwards motion towards dust collecting hoppers that constitute the floor of the device. A drawback of these devices is their huge size and the problems related to the erosion wear experienced by the dust-collecting hoppers.

Depending on the gas velocity, laminar flow or turbulent flow settling chambers can be distinguished, for flow Reynolds numbers smaller or larger than ~ 4000, respectively. For a settler as shown in Figure 5.9, processing a gas stream with velocity u (m/s), density ρ_{gas} (kg/m^3) and dynamic viscosity η_{gas} (Pa.s), the Reynolds number of the flow, using the hydraulic diameter d_H, is defined by:

$$Re = \frac{2\, d_H\, u\, \rho_{gas}}{\eta_{gas}} = 2\, \frac{H\, W}{H + W}\, \frac{\rho_{gas}}{\eta_{gas}} \tag{5-2}$$

Turbulent setlling chambers have somewhat lower collection efficiencies than laminar settler since the intense turbulent mixing prevents the settling. The efficiencies for laminar and turbulent settling chambers, the two extreme cases, are given by (Flagan and Seinfeld, 1988):

$$Laminar: \quad Efficiency(d_p) = \frac{u_t\, L}{u\, H} \tag{5-3}$$

$$Turbulent: \quad Efficiency(d_p) = 1 - exp\left(-\frac{u_t\, L}{u\, H}\right)$$

where u_t is the terminal settling velocity of the particles (☛ Appendix to this chapter).

5.6 Cyclones

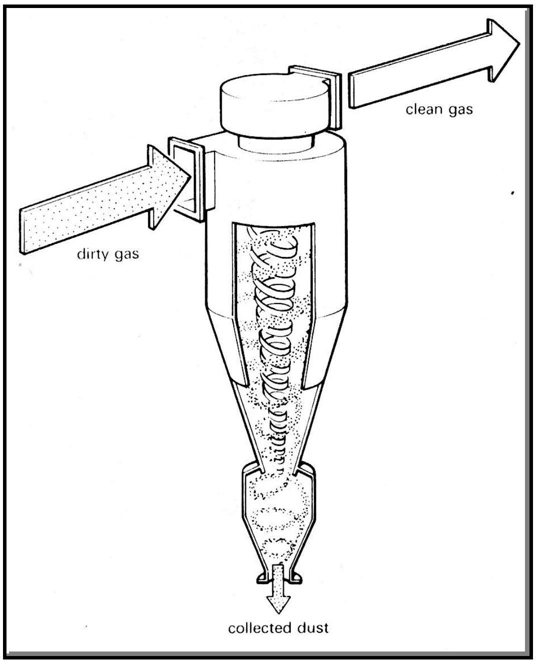


Figure 5.10 A typical gas cyclone (picture from Klingspor and Vernon, 1988)

5.6.1 Principle of operation, lay-out

A cyclone is a mechanical separator that is capable of reducing dust concentrations in a gas stream from several g/m³ to below 0.1 g/m³. The principle of operation is to force the flow into a swirling motion with high tangential velocities, inducing tangential forces on the particles that are of the order of several hundred times gravity. An impression of a gas cyclone and the flow field inside a cyclone is given in Figure 5.10, showing an outer, downwards vortex surrounding an inner, upwards vortex. The pressure distribution inside a cyclone is such that at the bottom outlet for the collected particles the gas stream is forced to turn upwards. Particles that are flung to the wall by the centrifugal forces will flow downwards along the wall towards the bottom outlet: some part may be re-entrained into the gas stream, though. Cyclones are applied also for removing *e.g.* water from oil at oil fields ("hydrocyclones").

Cyclones are considered to be very powerful and cheap pre-separators for gas clean-up purposes. Their removal efficiency is, however, limited to ~ 90% for a cyclone of reasonable size (diameters up to 1 m) with reasonable pressure drop, and the removal efficiency rapidly deteriorates for particles smaller than 10 μm. The most important pro's and contra's of the use of gas cyclones is given in Table 5.8.

Table 5.8 Characteristics of gas cyclones

Advantages	Disadvantages
Simple	Large pressure drop
Cheap	Low efficiency
Compact	"Catch" removal problems
Large capacity	No particle removal below ~ 5 μm
	Problems at temperatures above ~ 400EC

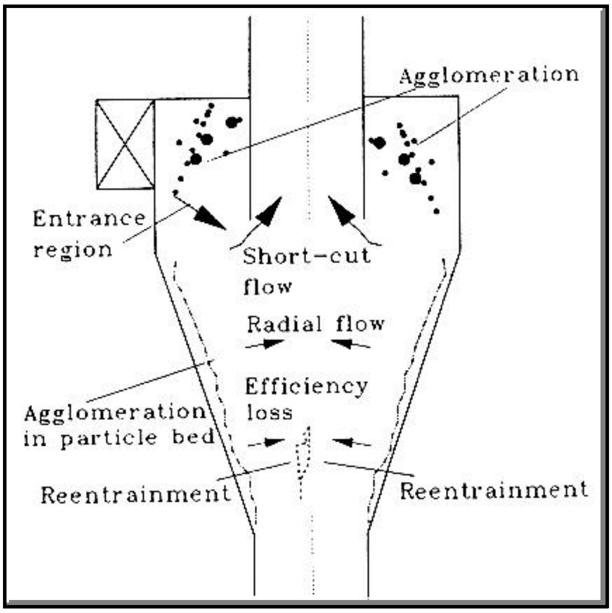


Figure 5.11 Processes determining gas cyclone separation efficiency (picture from Bernard, 1992)

Cyclones are being used at temperatures up to and above 1000EC, for example in PFBC systems (7 chapter 2). By applying two or three units in series acceptable removal efficiencies may be obtained.

The removal efficiency of a cyclone is affected by many "side-processes" due to the design of the cyclone, the flow pattern and the pressure profile. The most important are shown in Figure 5.11. Agglomeration of particles at the inlet region is the result of stronger centrifugal forces on larger particles than on smaller ones, causing a "sweeping" effect. At the same time, particles may short-cut from the inlet to into the gas outlet when the outlet tube, called "vortex finder" does not penetrate deep enough into the cyclone from above. Going downwards along the wall, the layer of collected particles may come in contact with the flow field of the gas flow, leading to re-entrainment. Most critical is the position near the bottom outlet for the collected dust, where the downwards swirl turns upwards into the inner vortex towards the gas outlet. At that point strong re-entrainment of collected particles may occur, which most certainly will leave the cyclone with the gas (Bernard, 1992).

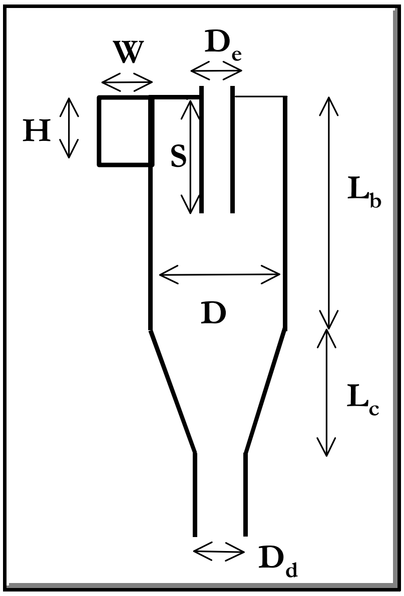


Figure 5.12 Lapple cyclone design lengths (after Cooper and Alley, 1994)

Depending on the application, three types of gas cyclones can be distinguished: besides a "conventional" cyclone one may select either a "high efficiency" or a "high throughput" design. The latter compromises efficiency at the benefit of higher throughput and lower pressure drop, the opposite can be chosen as well. For the widely used, so-called "Lapple" cyclones, design parameters are given in Figure 5.12 and Table 5.9 (Cooper and Alley, 1994). Typical gas inlet velocities are 15 - 30 m/s.

Table 5.9 Design parameters for a Lapple cyclone (see Figure 5.12)

	High efficiency	Conventional	High throughput
Height of inlet H/D	0.5 ~0.44	0.5	0.75 ~ 0.8
Width of inlet W/D	0.2 ~ 0.21	0.25	0.375 ~ 0.35
Diameter of gas exit De/D	0.4 ~0.5	0.5	0.75
Length of vortex finder S/D	0.5	0.625 ~ 0.6	0.875 ~0.85
Length of body Lb/D	1.5 ~1.4	2.0 ~1.75	1.5 ~1.7
Length of cone Lc/D	2.5	2	2.5 ~2.0
Diameter of dust outlet Dd/D	0.375 ~ 0.4	0.25 ~ 0.4	0.375 ~ 0.4

5.6.2 Removal efficiency, pressure drop

The efficiency of a cyclone can be described (as for any particulate control device discussed in this chapter) by a so-called "grade efficiency curve", which gives the removal efficiency as function of particle size. An important number is the so-called "cut-size", d_{50}, which is the particle size for which the removal efficiency is 50%. For particles larger than the cut size more than 50% is removed, for particles smaller than the cut size removal efficiency is less than 50%. For cyclones such as the Lapple cyclones the "cut size" can be calculated as:

$$d_{50} = \sqrt{\frac{9\eta_{gas} W}{2\pi \, V_i \, (\rho_{solid} - \rho_{gas})}} \quad with \;\; N = \frac{L_b + ½\, L_c}{H} \tag{5-4}$$

where W is the width of the gas inlet (m), V_i the inlet gas velocity (m/s), ρ_{solid} and ρ_{gas} the densities of solid particles and gas, respectively, (kg/m³), η_{gas} is the dynamic viscosity of the gas (Pa.s) and N is the number of rotations (#) the gas flow makes before turning upwards to the vortex finder. For a Lapple cyclone, N is apparently defined given by the dimensions of the cyclone (see Figure 5.12).

The "grade efficiency" of the cyclone can be described as a relation between particle size, d_p , and cut size d_{50}:

$$Eff\,(d_p) = \frac{1}{1 + (\frac{d_{50}}{d_p})^2} \tag{5-5}$$

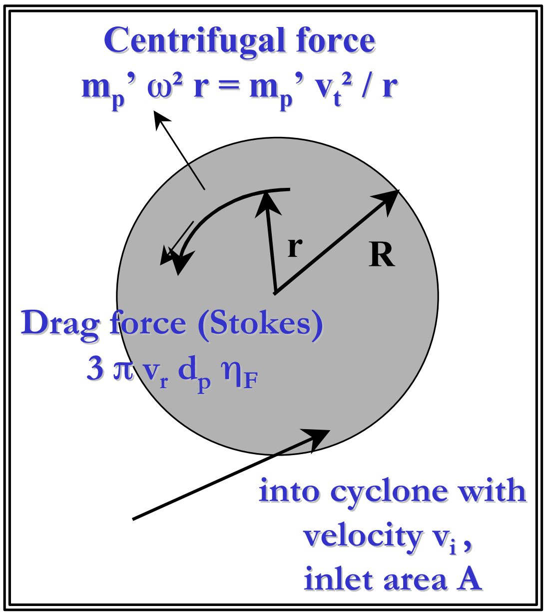


Figure 5.13 Particles in cyclones (top view): forces on a particle (Zevenhoven and Heiskanen, 2000)

The calculation of cut size by eq. (5-4) follows from considering the force balance on a particle in a cyclone as shown in Figure 5.13. For a particle with volume V_p the reduced mass m'_p equals $V_p(\rho_{solid} - \rho_{gas})$, with particle and gas densities ρ_{solid} and ρ_{gas}. A force balance, *i.e.* equating the centrifugal force to the drag force gives

$$\frac{m'_p v_t^2}{r} = 3\pi v_r d_p \eta_F \tag{5-6}$$

for a particle at radial position r, using Stokes' Law for the drag force (☛ Appendix). The radial and tangential velocities v_r and v_t can can be approximated by

$$v_r \approx \frac{V_i A}{2\pi\, r\, h} \quad where\ h = length\ scale\ for\ the\ cyclone$$

$$v_t r^n = V_i R^n \qquad where\ n = 0.5..0.55\ for\ a\ gas\ cyclone \tag{5-7}$$

An estimation for the cut size is then found assuming that a particle with size $d_p=d_{50}$ will move at force equilibrium at radial position r=R:

$$(\frac{r}{R})^n = \frac{\pi\, h\, \rho_{solid} V_i d_p^2}{9\, A\eta_F} \quad which\ gives$$

$$with\ d_p = d_{50},\ r = R\ the\ result\ is\ d_{50} = \sqrt{\frac{9\, A\eta_F}{\pi\, h\, \rho_{solid} V_i}} \tag{5-8}$$

which is identical to eq. (5-4) when A=H×W and h=2L_b+L_c.

Pressure drop is the second important cyclone performance characteristic, after collection efficiency. It can be estimated by:

$$\Delta p = ½ \frac{\rho_{gas} V_i^2 K H W}{D_e^2} \quad (Pa) \tag{5-9}$$

which contains the design dimensions H, W and D_e (see Figure 5.12). For the constant K, the value 12 ~ 18 is suggested, with K=16 as recommended value (Cooper and Alley, 1994).

5.6.3 Developments in gas cyclone design

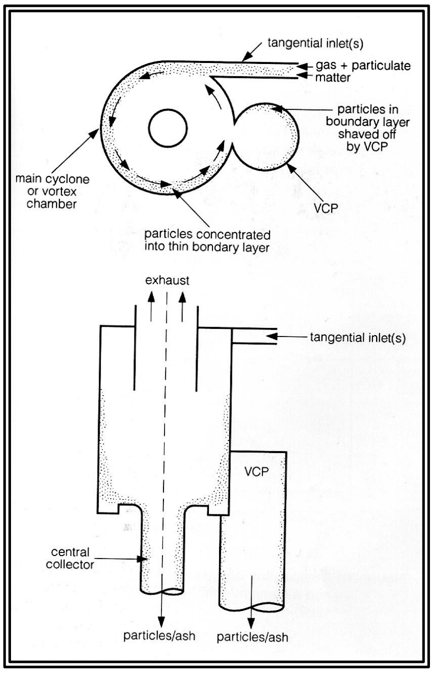


Figure 5.14 Gas cyclone with collector pockets (picture from Soud, 1995)

Two design concepts for improved gas cyclones are shown in Figures 5.14 and 5.15 (Soud, 1995).

In the first design, one or more vortex collector pockets (VCPs) are attached to the main cyclone with the objective to improve the removal efficiency of the finest particles. Advances might be reduced height and pressure drop.

The other design, the so-called aerodyne rotary flow cyclone operates with two vortices in opposite direction: the first being the flue gas that is entered through a stationary spinner, the second vortex enters from the top. The result is a net downwards flow for the particulates whilst the main gas steam moves upwards. The (clean) secondary gas flow should be of the order of ⅔ of the primary gas stream: using the dusty gas to be cleaned also as the secondary gas stream gives a much worse removal performance.

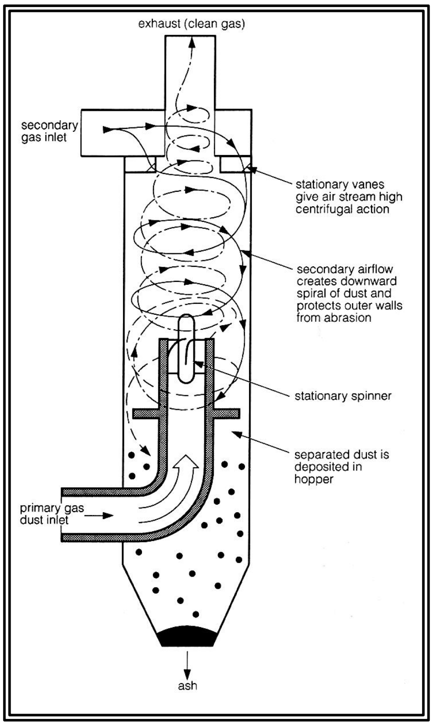


Figure 5.15 Aerodyne rotary flow cyclone (picture from Soud, 1995)

5.7 Electrostatic precipitators (ESPs)

5.7.1 Principle of operation, lay-out

The removal of particles using electrostatic precipitator, hereafter abbreviated ESP, is based on applying a surface force instead of a body force to fine particles. The surface of the particles is where the electrostatic charge is residing. Combined effects of the particle production or formation process and further processing such as transport along a conveying system or flue gas duct result in sometimes large electrostatic charges on solid particulates or droplets. For gas clean-up this charge is generally too low, however. The combination of particle charging, extracting the particle or droplet from the gas stream and deposition on a collection plate system is the general procedure that is referred to as electrostatic precipitation.

For fly ash emission control from combustion and gasification of fossil fuels, mainly coal and peat, ESPs are the most widely used technology. Outside what can be called the "developed world" (EU, North America, Japan and Australia) an ESP for fly ash emission control is generally the only emission control system used at electric power stations. Reasons for this are obvious: the technique of ESP is rather simple, it offers high removal efficiencies at low pressure drop and low electric power consumption, and the electricity needed to operate the system is readily available.

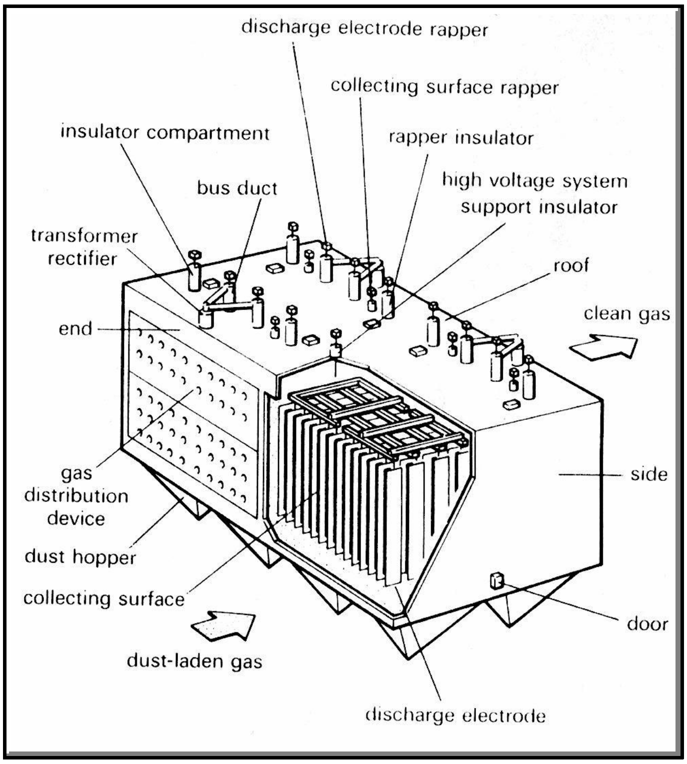


Figure 5.16 Typical lay-out of an ESP (picture from Klingspor and Vernon, 1988)

Typical power consumption of an ESP is of the order of 0.05 - 0.3 W per m_{STP}^3/s gas volume (Cooper and Alley, 1994). Comparing this to a flue gas production rate for a typical coal-fired power plant, which is 0.3 - 0.4 $m^3_{STP}/MJ_{thermal}$ shows that the "internal" electric power consumption of an ESP unit is very small.

The typical features of an ESP are shown in Figure 5.16 for a wire-

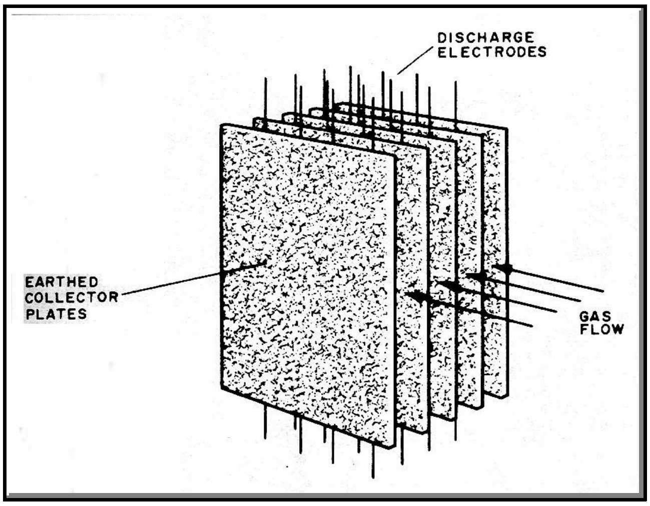


Figure 5.17 Schematic electrode geometry for a wire-and-plate ESP (picture from Coulson and Richardson, 1978)

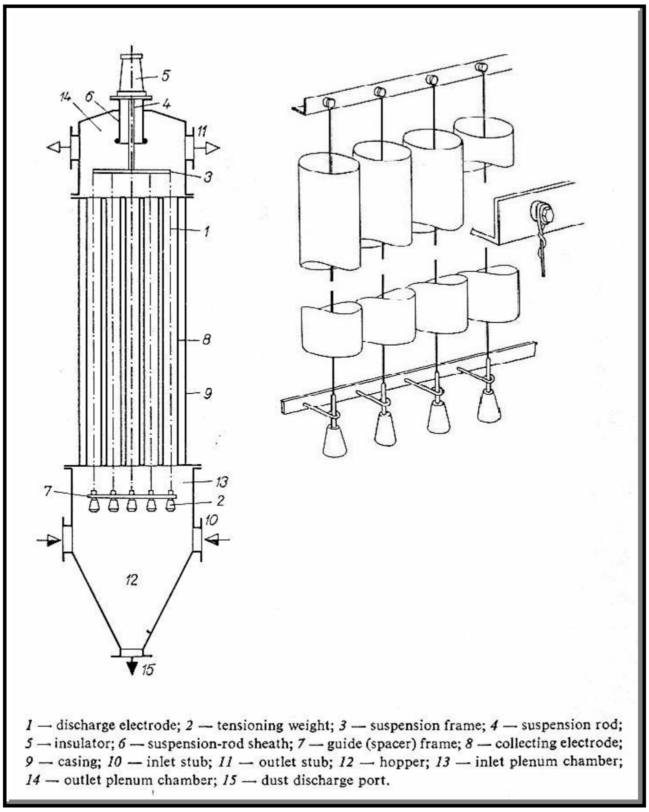


Figure 5.18 Typical layout of a wire-in-tube ESP (pictures from Böhm, 1982)

and-plate unit operated with a horizontal gas flow. A schematic picture of the electrode geometry for this is shown in Figure 5.17. A wire-in-tube ESP design is shown in Figure 5.18 - note that the gas flow is upwards !

Four process steps are involved in particle (or droplet) removal by ESP:

1. Charging of the particle
2. Particle movement relative to the gas flow
3. Particle deposition on a collection surface
4. Removal of the deposited particles from the system

This is further illustrated by Figure 5.19 for a system where a corona discharge is used to put an electrostatic charge (unit: Coulomb, C) on the particles. This charge will be much higher than the charge they already possess, and comes close to the maximum charge the particle can carry.

5.7.2 Corona discharge

Corona particle charging employs ions that are generated at the discharge electrodes which, together with the collector plates produce a highly non-uniform electric field. In general this is accomplished by putting direct current (DC) high voltages of the order of 30 to 75 kV on the discharge electrodes and earthing the collector plates. If the electric field intensity, E, (unit: V/m) becomes larger than the electric breakdown intensity (which

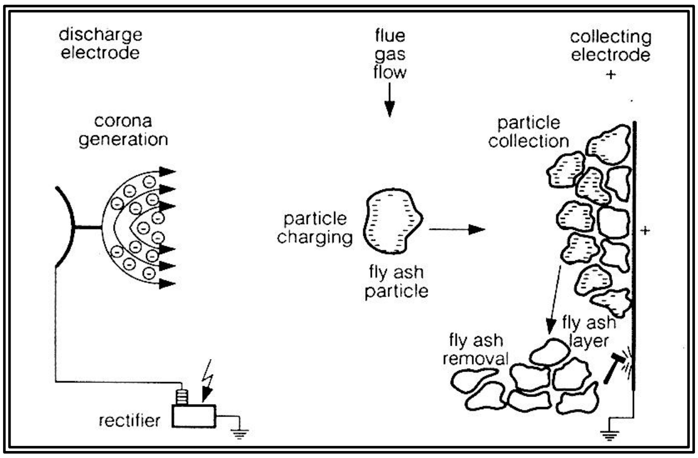


Figure 5.19 Particle charging and collection in ESP (picture from Soud, 1995)

is ~30 kV/cm for ambient air), ions such as N_2^+ and O_2^+ and electrons, e^-, are produced at the electrode. When operating at negative potential the electrons will travel towards the other electrode, whilst the positive ions will move to and collide with the electrode and become neutralised. Under positive corona operation the positive ions will move across the space between the electrodes after the discharge electrode has taken up the electrons. More detail on electric breakdown and corona discharge processes is given elsewhere (Böhm, 1982, Kuffel and Zaengl, 1984).

5.7.3 The electric field

The electric field strength (or intensity) E is defined by the electrode geometry and the voltage difference $\Delta\phi$ (unit: Volt, V) that is applied between them:

$$\underline{E} = -\nabla\phi \quad \textit{with } \nabla = (\partial/\partial x, \partial/\partial y, \partial/\partial z)\ (\textit{in Cartesian coordinates}) \tag{5-10}$$

In ESPs the electric field is basically 2-dimensional, without significant electric fields in the gas flow direction. For practical reasons, the electric field strength is related to the distance, x (m) from the centre of the discharge electrode and a "configuration factor for the electrode geometry", F (-), resulting in a one-dimensional description of the electric field:

$$E(x) = \frac{\Delta\phi}{F\,x} \tag{5-11}$$

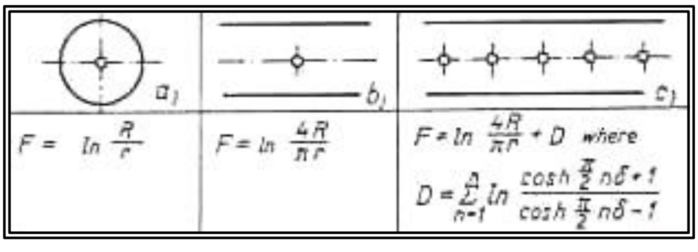


Figure 5.20 Electrode system configuration factors, F. δ = d/r, d = distance between wires, r = wire radius (picture from Böhm, 1982)

For a wire and plate geometry as shown in Figures 5.16 an 5.17, the values for F are calculated as shown in Figure 5.20 for one wire between plates (b), for multiple wires between plates (c) and for a

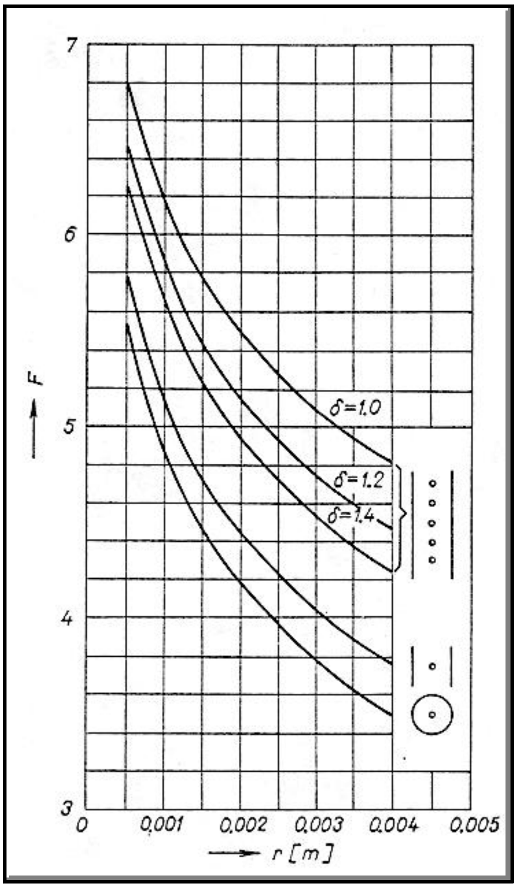


Figure 5.21 Electrode system configuration factors - see also Figure 5.20 (picture from Böhm, 1982)

wire-in-tube geometry as shown in Figures 5.18 (a). For a wire-in-tube ESP the electric field strength and the equipotential lines are shown in Figure 5.22. Electrode geometry factors, F, are collected in Figure 5.21 for different geometries and discharge wire electrode radius, r (m) combinations.

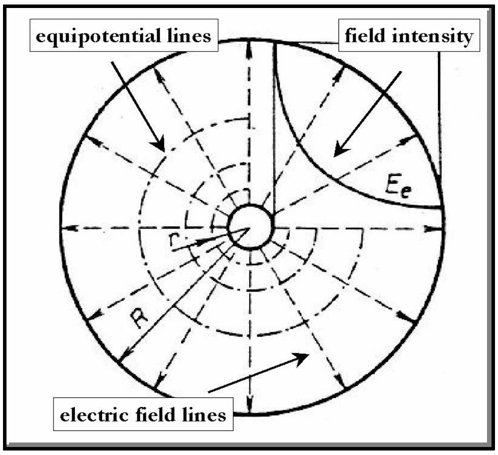


Figure 5.22 Electric field for a wire in tube ESP (after picture from Böhm, 1982)

The electric field created by the electrode system is affected by the presence of the electrons, charged ions and charged particles in the gas stream. This alters the electric field strength especially near the collection electrode (see *e.g.* Böhm, 1982)

5.7.4 Particle charging

The success of ESP operation depends primarily on the charging of the particles. Two corona charging processes are distinguished, being diffusional charging and field charging respectively. Diffusional charging implies that the particle or droplet to be charged is charged by diffusion interactions with a cloud of ions. For fine particles (smaller than ~ 0.5 μm) this will be the most important charging mechanism.

The maximum charge that can be acquired by a particle by diffusion charging depends mainly on particle size d_p (m) :

$$q_{\max,\,diffusion} \sim 10^8\, e\, d_p \qquad (C) \tag{5-12}$$

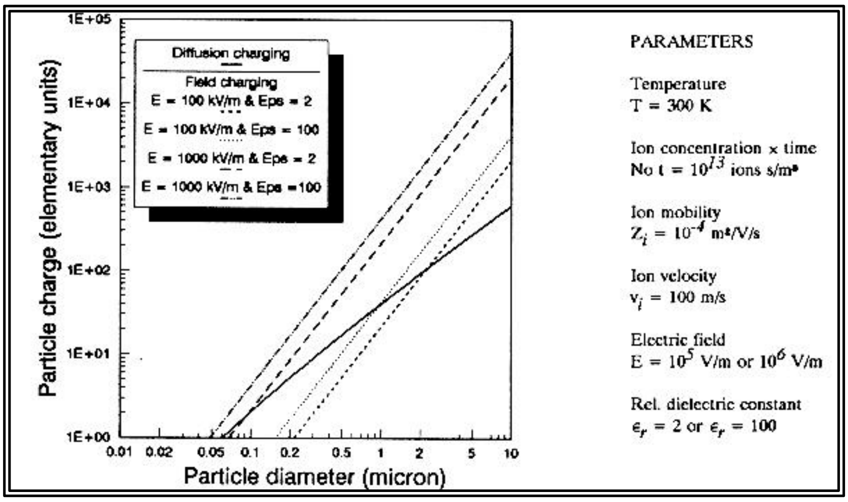
where e is the unit charge, *i.e.* the charge of an electron: e = $1.6\textbf{H}10^{-19}$ C.

Larger particles cannot be charged to a sufficiently high level by diffusion charging alone and are charged by the field charging mechanism. As a result of the electric field in the ESP the motion of the ions and electrons is ordered along the direction of the electric field. This leads to high rates of collisions between ions or electrons and the particles, resulting in high charge levels. The maximum particle charge depends on the properties of the particle, its size, d_p, and the intensity of the external electric field, E_0:

$$q_{max,\,field} = 4\pi\, \varepsilon_0\, E_0\, d_p^2 \frac{3\varepsilon_r}{\varepsilon_r + 2} \quad (C) \tag{5-13}$$

Here, ε_0 is the dielectric constant of vacuum (ε_0 = $8.854\textbf{H}10^{-12}$ C/Vm) and ε_r (-) is the relative dielectric constant of the particulate matter or droplet (relative to vacuum) that is charged. (The dielectric constant $\varepsilon = \varepsilon_0\, \varepsilon_r$ determines whether or not the field lines of the electric field can go through the particle (ε_r ~1) or are deflected around the particle (ε_r **6 4**), and is related to the optical refractive index). The definition of maximum charge eq. (5-13) shows that a particle with a high ε_r can be charged to three times the level of a particle with low ε_r.

The charge that a particle or droplet eventually acquires depends on three additional factors, being time, the concentration of ions in the charging zone N_0 (#/m³) and the electric mobility of these ions, Z_i (m/s) /(V/m)), which determines the velocity of the ions, v_i (m/s) in response to the electric field E_0. Typical values for E_0 in the charging zone are 10^6 V/m. A theoretical description of the field charging process was given by Pauthenier and Moreau-Hanot (1932), see also Böhm (1982), or Zevenhoven (1999).



A comparison between particle charging according to the diffusion mechanism and the field charging mechanism for low and high values for ε_r and E_0 is given in Figure (5.23) for particle size 0.01 - 10 µm, at 300 K.

Figure 5.23 Field charging and diffusion charging of particles (picture from Zevenhoven, 1992)

Figure 5.23 shows that for particles smaller than 0.2 μm diffusion charging is the most important mechanism, for particles larger than 2 μm field charging dominates.

Corona charging with ions of one polarity (+ or -) that travel in one direction may be the most important charging method, but alternative techniques are being used as well. Charging by impaction with other surfaces, refered to as contact charging or tribo-charging is also possible. Other methods use bi-polar ions (+ and -), and/or ions or electrons that travel through the charging space in alternating directions. A widely used method is the pulsed corona technique, which implies that the voltage at the charging electrode is increased to values that could cause spark-over, during a short pulse time that is too short for actual spark-over to occur though (CIEMAT, 1998, Scott, 1997).

5.7.5 Electrical drift velocity of charged particles

The result of the charging efforts is that the particle or droplet is accelerated in the direction of the electric field, *i.e.* will get a drift velocity in a direction other than that of the gas flow. Typically the electric fields are of the order 10 kV/m, which is one or two orders of magnitude lower than in the field charging zone. The electrical drift velocity, v_e, (m/s) of the particles can be evaluated by equating the electrostatic force on a particle with charge q_p to the viscous drag force, which can be estimated by Stokes' Law, if necessary with a Cunningham correction factor for very fine particles (☛ Appendix):

$$q_p E = 3\pi\, v_e d_p \eta_{gas} \qquad (5\text{-}14)$$

Combining this with the maximum charge the particles can acquire by the diffusion charging and field charging mechanisms, eqs. (5-12) and (5-13) gives the following estimates for the electrical mobility:

$$\textit{fine particles, diffusion charging:}\quad v_e \sim \frac{10^8\, e\, E}{3\pi\, \eta_{gas}} \sim 0.01\ (m/s)$$

$$(5\text{-}15)$$

$$\textit{large particle, field charging:}\quad v_e \sim \frac{E\, E_0\, \varepsilon_0\, d_p\, \varepsilon_r}{\eta_{gas}(\varepsilon_r + 2)} \sim 0.1 \ldots 1\ (m/s)$$

where E_0 and E are the electric field strength in the corona discharge zone and in the charging zone, respectively.

5.7.6 Removal efficiency, Deutsch equation

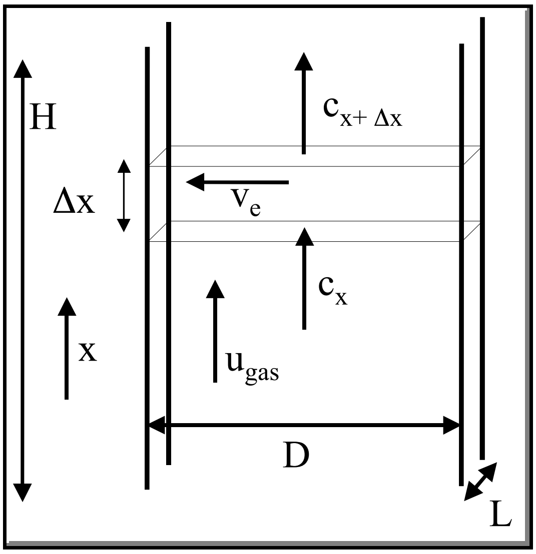


Figure 5.24 ESP geometry used for efficiency analysis (Zevenhoven and Heiskanen, 2000)

The removal efficiency of an ESP is directly related to the electrical drift velocity of the particle. Based on the geometry given in Figure 5.24 an efficiency can be derived, following the approach by Deutsch from 1922 for an ESP with plate height H (m), plate distance D (m), depth L (m), gas velocity u_{gas} (m/s). The electrical drift velocity of the particle is v_e (m/s), particle concentration is referred to as c (kg/m³).

A mass balance for a small section with thickness Δx gives in-out=removed, gives:

$$\tfrac{1}{2} u_{gas} HLD(c_{at\,x} - c_{at\,x+\Delta x}) = v_e HL\Delta x\, \tfrac{1}{2}(c_{at\,x} + c_{at\,x+\Delta x})$$

$$\mathit{Taylor series, small}\ \Delta x \rightarrow dx:\quad \tfrac{1}{2} u_{gas} D \frac{dc}{dx} = v_e c \qquad (5\text{-}16)$$

$$\mathit{integrate\ from}\ c = c_{in}\ \mathit{at}\ x = 0:\quad c(x) = c_{in} \exp\left(-\frac{2 v_e x}{u_{gas} D}\right)$$

Integrating this over the height H, from gas inlet to gas outlet, noting that the flow through the section is Q (m³/s) = u_{gas}×D×L, noting that the collector surface (2 sides!) is equal to A (m²) = 2×H×L, gives the famous Deutsch equation for particle removal efficiency:

$$\mathit{Efficiency} \equiv \frac{c_{in} - c_{out}}{c_{in}} = 1 - \exp -\left(\frac{v_e A}{Q_{gas}}\right)$$

$$\mathit{with\ Matts\text{-}Öhnfeldt\ correction}: \qquad (5\text{-}17)$$

$$\mathit{Efficiency} \equiv 1 - \exp -\left(\frac{v_e A}{Q_{gas}}\right)^k \quad k = 0.4 \ldots 0.6$$

The correction factor by Matts-Öhnfeldt was presented in the 1970s, based on

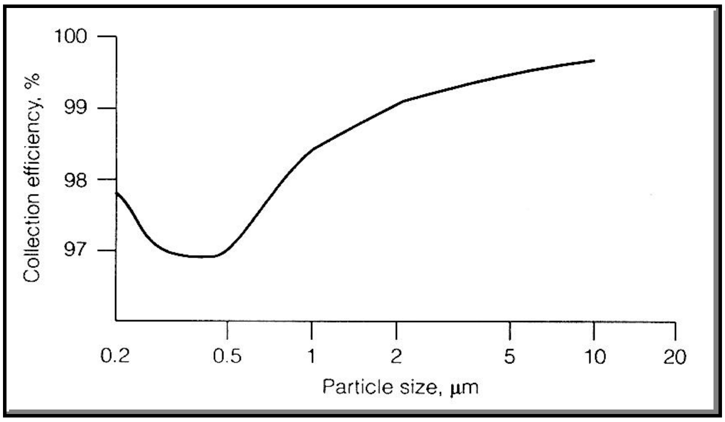


Figure 5.25 A typical grade efficiency curve for an ESP (picture from Soud, 1995)

particle size distribution and other dust-related properties, and allows for a better description of ESP performance (Klingspor and Vernon, 1988). Typically, k=0.5.

A general grade efficiency curve for an ESP is shown in Figure 5.25.

5.7.7 Effects of particle and gas properties, and temperature

It was already mentioned above that the properties of the particles or droplets to be removed, besides their size, have an effect on the particle charging behaviour and hence the removal from a gas stream by an ESP. This is made more complicated by interactions between the particle or droplet and the gas, plus the effect of temperature. Some implications this has are illustrated by Figure 5.26, which gives the effect of temperature and coal sulphur content on coal fly ash resistivity.

The temperature curves shown in Figure 5.26 (*right*) are the result of increasing surface resistivity combined with decreasing volume resistivity with increasing temperature. Depending on the chemical composition of the fly particles considered here this gives a maximum resistivity at between 140 and 170EC. From an ESP point of view, the resistivity of the particles is preferably in the range 10^5 - 10^{10} ohm.cm. When the resistivity is very high (> 10^{11} ohm.cm) it will be difficult to charge the particles and back-corona problems may arise, *i.e.* a spark from the collection plate to the discharge

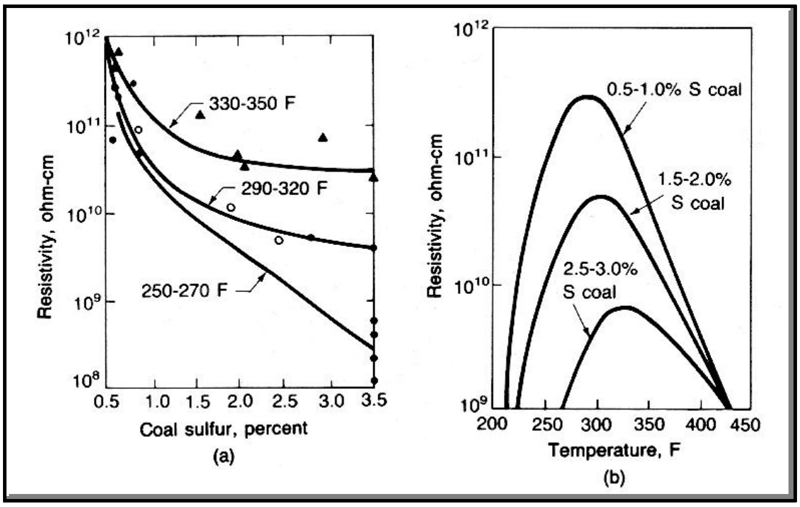


Figure 5.26 Influence of temperature and coal sulphur content on fly ash resistivity (pictures from Cooper and Alley, 1994) Note: 200EF ~ 95EC, 300EF ~ 150EC, 450EF ~ 220EC

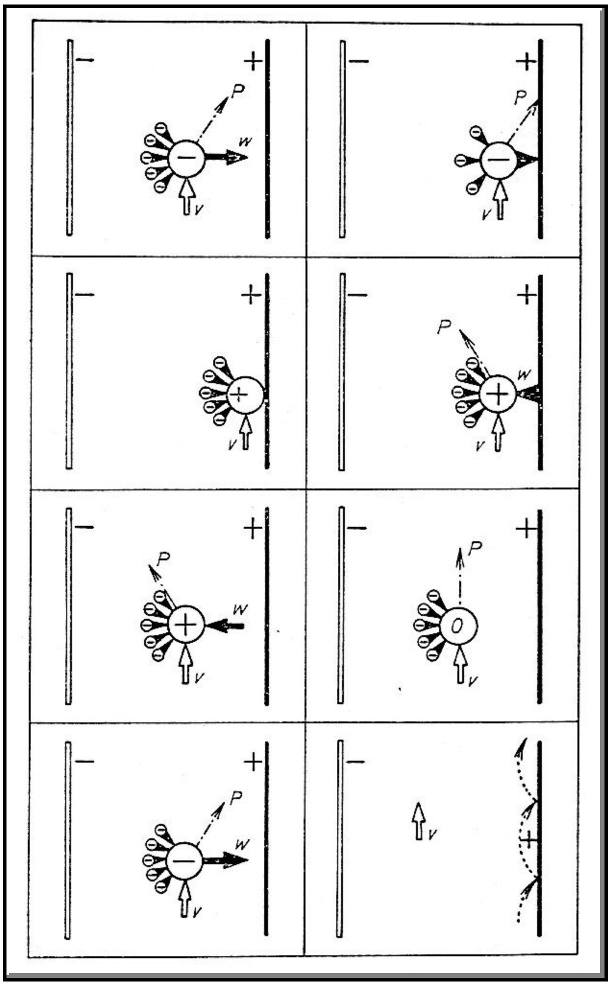


Figure 5.27 Repeated rebouncing of a conductive particle between two electrodes (picture from Böhm, 1982)

electrode wire as a result of high field strengths building up in the collected material layer. With very low resistivities (< 10^4 ohm.cm), usually as a result of presence of carbon, the particles will loose their charge very rapidly to, for example, water in the gas or other particles. Moreover, upon contact with the collection electrode or collected material layer they may rapidly switch sign (+ **X** -) and become re-entrained. This is illustrated by Figure 5.27 for a negatively charged particle.

Figure 5.26 shows also the large effect that the sulphur content of a fuel as coal has on fly ash resistivity. Part of the success of ESP has to do with the fact that its history lies at the east part of the US, where relatively high-sulphur coals are fired (*e.g.* Pittsburgh, Pocahontas, Illinois). Switching to low sulphur coals from the west part of the US (*e.g.* Powder River Basin) resulted in large problems with ESP performance, enforcing lower power outputs of coal-fired units. It was soon found that the small part of the fuel sulphur that is oxidised from SO_2 to SO_3 forms, with moisture, sulphuric acid (H_2SO_4) (**7** chapter 3) which condensates on the surface of the fly ash particles. This reduces the resistivity and increases the cohesivity of the dust (Scott, 1997). A lower fuel sulphur content leads to charging problems and more serious back-corona.

For coal fly ash conditions that may be difficult for proper ESP operation are shown in Figure 5.28, with options for improvement in Figure 5.29. Apart from sulphur (S), components that decrease fly ash resistivity are iron (Fe_2O_3,) sodium (Na_2O), and water. Components that increase resistivity, making precipitation more difficult are calcium (CaO), magnesium (MgO) silicon (SiO_2) and aluminum (Al_2O_3) (Soud, 1995).

- Operation near maximum resistivity (temperature approximately 150–190°C)
- Critical bulk resistivity for incipient back corona
  Cold-side ESP 1-3 x 10^{10} ohm cm
  Hot-side ESP 2-5 x 10^{9} ohm cm
- Bituminous coal ash
  Sulphur Low ≤1%
  $SiO_2 + Al_2O_3$ High >80%
  Fe_2O_3 Low <5%
  Na_2O Low <0.5%
- Lignite ash
  Sulphur Low ≤1%
  $CaO + MgO > Fe_2O_3$ By 3-6 times
  Na_2O Low <0.5%
  Free lime Available
- Low gas moisture 5-7% volume
- Boiler fouling – loss of Na_2O with lignitic ash and hot-side ESP

Figure 5.28 Difficult conditions for ESP operation (from Carpenter, 1998)

- Flue gas conditioning
  (to lower fly ash resistivity)
- Pulse energisation
  (allows more useful power to be applied to the ESP)
- Humidification
  (spraying water into the flue gas to lower its temperature and reduce fly ash resistivity and cohesivity)
- Optimising existing surface
- Mechanical upgrades
  (such as increasing the specific collection area by adding additional fields or increasing the plate height, if space limitations allow)

Figure 5.29 Options for ESP performance inprovement (from Carpenter, 1998)

Table 5.10 Optimisation of an ESP after switch to lower sulphur fuel (from Carpenter, 1998)

Coal type	HHV, MJ/kg	Ash, wt%	Sulphur, wt%	ESP specific collection area, $m^{-1}s$
Midwestern bituminous	24.4	15	3.2	54
Switch to PRB	18.9	15	0.3	169
with pulse modulation				77
with SO_3 conditioning				59

How optimisation of an ESP can influence the performance after a fuel switch to a lower sulphur coal is given in Table 5.10. The performance of the ESP is expressed as specific collection area, SCA (= collection area/gas flow rate, unit: $m^2/(m^3/s)$) needed for a certain dust removal efficiency. Typically, switching from a 1%-wt sulphur coal to a 0.6 %-wt sulphur coal will require a 20% larger ESP collection area.

A very important property of the gas phase when it comes to particle resistivity is the moisture content of the gas, especially at temperatures below 200 EC. As Figure 5.30 shows (for cement kiln dust), a typical water content of ~10% in the gas can lower particle resistivity by several orders of magnitude. Water molecules are very active in removing electric charge from particles, and moisture plays an important role via its interaction with the sulphur oxides in the gas.

By its effect on the particle charge that is acquired, the resistivity of the particles or droplets determines the electric drift velocity the particle as illustrated by Figure 5.31. This translates to removal efficiency via the Deutsch equation.

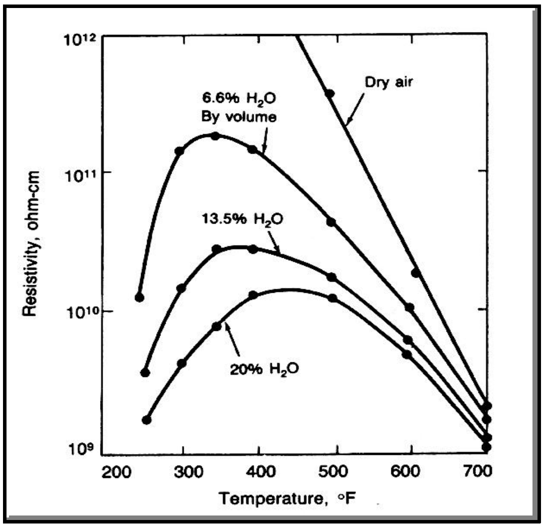


Figure 5.30 Effect of moisture on particle resistivity (picture from Cooper and Alley, 1994) (300**E**F = 149**E**C, 600**E**F = 316**E**C)

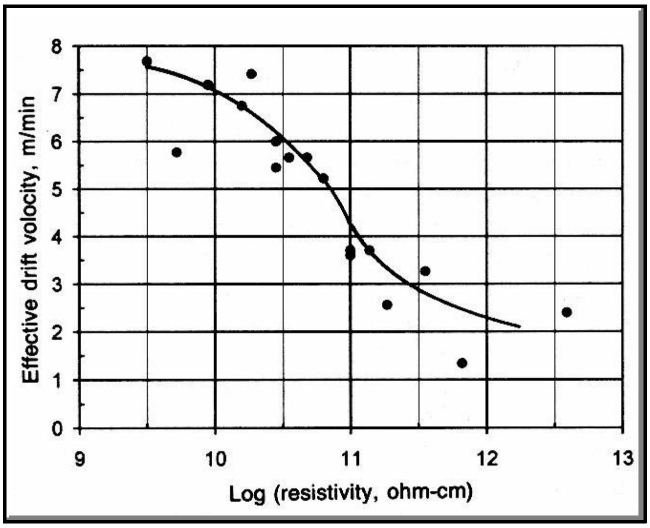


Figure 5.31 Typical relation between fly ash resistivity and electric drift velocity (picture from Cooper and Alley, 1994)

5.7.8 ESP efficiency improvement, flue gas conditioning

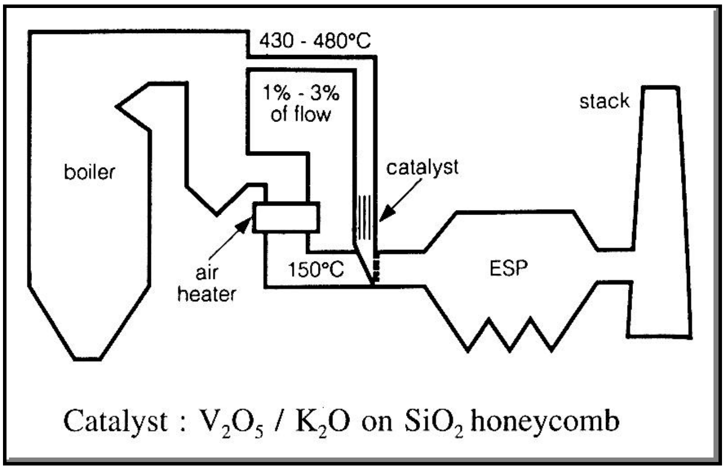


Figure 5.32 EPRICON SO_2 to SO_3 process for ESP (picture from Soud, 1995)

An ESP performance improvement process patented by EPRI is the EPRICON SO_2 to SO_3 converter process. A small part of the flue gas (with typically a few 1000 ppm SO_2 and some 10 ppm SO_3) is passed over a catalyst bed where a few % of the SO_2 in the flue gas is oxidised to SO_3 - see Figure 5.32. This reduces fly ash surface resistivity and improves efficiency as described above.

Another method is based on sulphur burning: if the fuel doesn't produce SO_2, elemental sulphur or SO_3 can be used for "conditioning" of the flue gas (actually the fly ash particles are being "conditioned"). Also combined injection of SO_3 and NH_3 can be employed, the first to adjust fly ash resistivity, the second to improve cohesivity and the effectivity of the ESP voltage. The cheapest option is to burn elemental sulphur in presence of a catalyst and injecting SO_3 into the flue gas. (Soud, 1995).

5.7.9 ESP design characteristics, hot/cold - side ESP, wet ESP.

Typical design data for ESPs are given in Table 5.11. Most ESPs are operated as so-called "cold-side" ESPs, located between air pre-heater and FGD system (if that is present) at 120-200EC. This is not optimal when considering fly ash resistivity (see Figure 5.26). Alternatively, so-called "hot-side" ESPs are operated at 300-450EC, upstream of the air pre-heater. Since particle resistivity is determined by volume conductivity under these conditions, there is less sensitivity to gas composition. A disadvantage is that heat losses from hot ESPs can be significant, and they are more sensitive to temperature changes when operating the furnace or boiler at partial load.

Table 5.11 Typical design characteristics for cold-side ESPs
(data from Cooper and Alley, 1994)

Temperature	120 - 200°C	Power / collector area	
Gas flow velocity	1 - 3 m/s	ash resistivity 10^4-10^7 ohm.cm	~ 43 W/m^2
Gas flow / collector area	15 - 125 s/m	ash resistivity 10^7 - 10^8 ohm.cm	~ 32 W/m^2
Plate-to-plate distance	0.15 - 0.4 m	ash resistivity 10^9-10^{10} ohm.cm	~ 27 W/m^2
Electric drift velocity	0.02 - 2 m/s	ash resistivity ~10^{11} ohm.cm	~ 22 W/m^2
Corona current / collector area	50 - 750$\mu A/m^2$	ash resistivity ~10^{12} ohm.cm	~ 16 W/m^2
Corona current / gas flow	0.05 - 0.3 J/m^3	ash resistivity ~10^{13} ohm.cm	~ 11 W/m^2

When an SCR unit for NOx control (7 chapter 4) is part of the flue gas clean-up system (which operates at 350-400EC) it is beneficial to have the ESP upstream of the SCR. This "hot side, low dust" operation will improve SCR catalyst lifetime and reduce SCR operation and maintenance problems. Especially for flue gas from waste incineration furnaces this arrangement is preferable.

An interesting option that gives very high ESP efficiencies is to operate in a "wet" mode, *i.e.* with a stream of water that continuously removes the dust from the collector surfaces as a slurry. This finds application especially in Japan where ESPs located near cities are forced to control particulate emissions to 10 mg/m^3_{STP} or below. Advantages are high efficiency (less re-entrainment) and less sensitivity to particle resistivity, higher gas velocities (giving smaller devices) and that sub-micron particles can be collected as well. A major advantage is the absence of the rapping devices that are required to remove the particles from cold-side ESP collector surface. Disadvantages are that the gas temperature has to be reduced significantly, that corrosion problems can arise and that high dust and high SO_3 concentrations cause problems. Besides that, a waste water stream is generated that needs handling (Scott, 1997).

High temperature ESPs will be discussed further in section 5.11, below.

Electrostatic Precipitators

(Nazaroff & Alvarez-Cohen, pages 447-453 + added material)

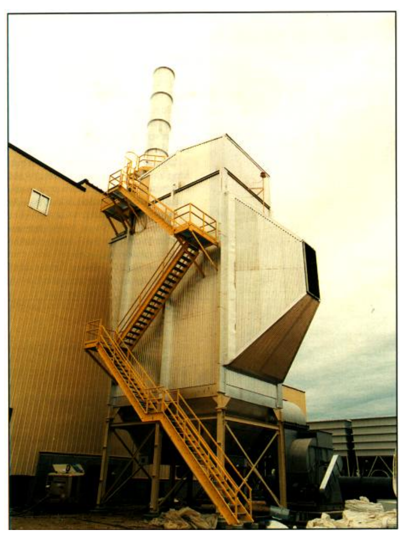
(http://www.opgpower.com)

ESPs are common installations on coal-fired power plants to remove over 99% of ash particles from million ft^3 per minute of fumes.
They stand tens of meters tall.

(http://www.forbesmarshall.com/)

A couple more pictures of electrostatic precipitators

(www.dom.com/)

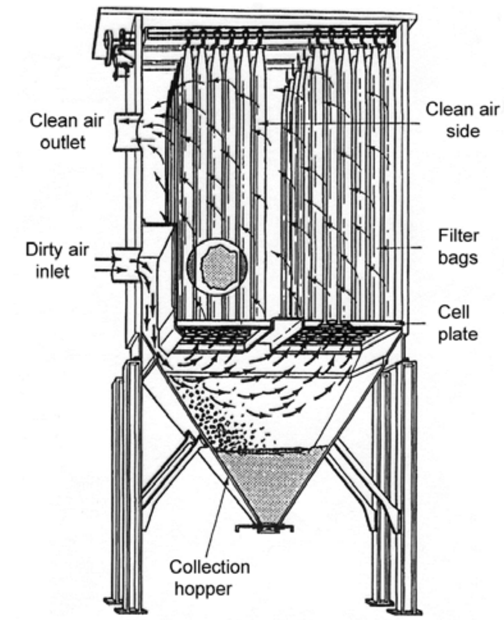


(http://www.ppcesp.com/ppcart.html)

Electrostatic precipitators (ESPs) are major pieces of equipment and are expensive.

Electrostatic precipitators work better than the alternative, the fabric filter baghouse…

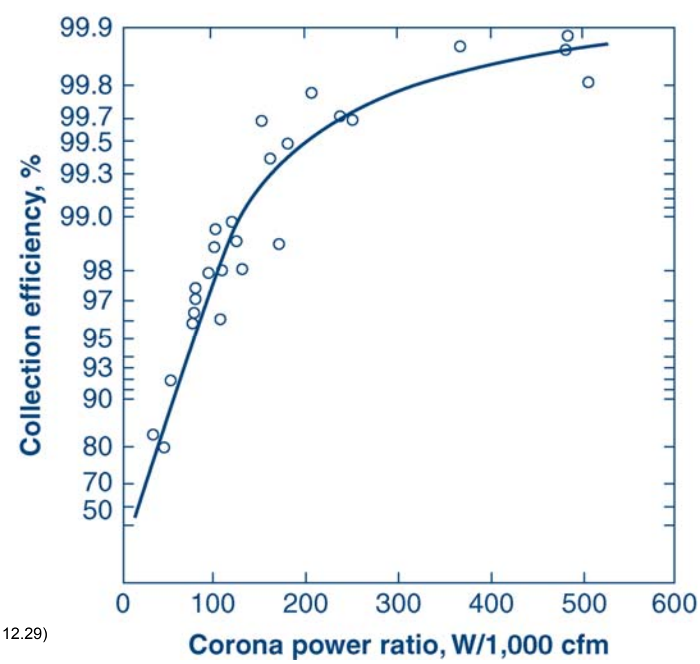
… especially when the gas to be treated and its particles are hot or wet.



Typical simple fabric filter baghouse
(*Source*: Wheelabrator Pollution Control)

Typical efficiency of an electrostatic precipitator as a function of the corona power ratio, which is power consumed (in Watts) divided by the airflow in cubic feet per minute (cfm).

Note the extremely high efficiencies, nearing 100%.



(*Source*:
Mihelcic & Zimmerman, Figure 12.29)

Comparison:
CYCLONES versus ELECTROSTATIC PRECIPITATORS

Cyclones and electrostatic precipitators are two different types of equipment, each capable of removing particles from an air stream. When the decision arises regarding which type to adopt in a specific situation, one needs to know the advantages and disadvantages of each type of equipment.

<u>CYCLONES:</u>

Advantages:

Low capital cost
(= relatively cheap to buy and install)
Ability to operate at high temperatures
Low maintenance requirements
(absence of moving parts)

Disadvantages:

Relatively low efficiency
(especially for the smaller particles)
Limited to dry particles
(= not operating well on mist)
High operating cost
(= expensive to run, because of pressure loss)

<u>ELECTROSTATIC PRECIPITATORS:</u>

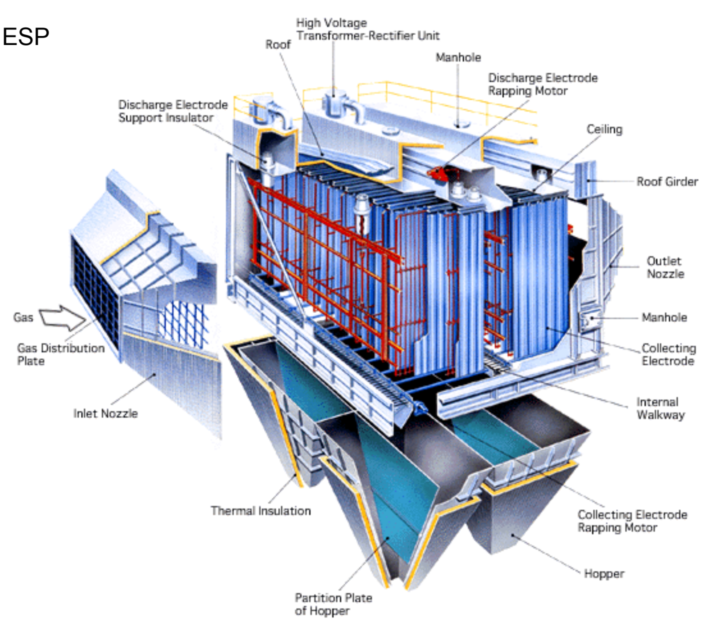
Advantages:

Low operating cost
(except at very high efficiencies)
Very high efficiency, even for smaller particles
Ability to handle very large gas flow rates
with low pressure losses
Ability to remove dry as well as wet particles
(= mist ok)
Temperature flexibility in design

Disadvantages:

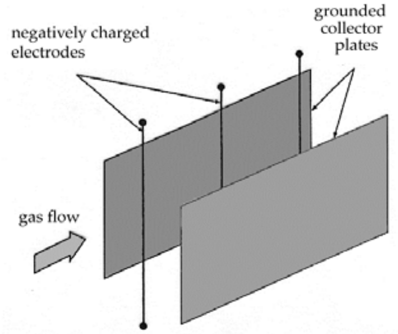
High capital cost
(= expensive to purchase and install)
Taking a lot of space
Not flexible once installed
Failure to operate on particles with
high electrical resistivity

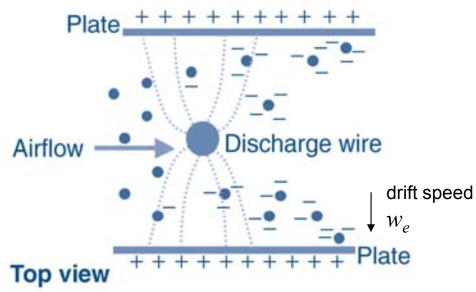
Inside an ESP



(http://www.qrbiz.com/product/1472881/Electrostatic-Precipitator.html)

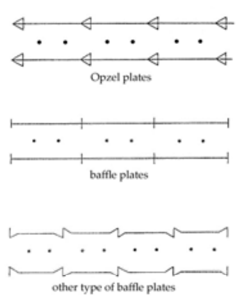
At the core
of the apparatus

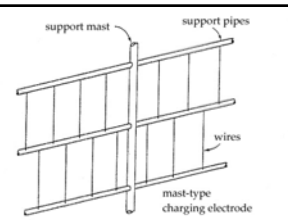


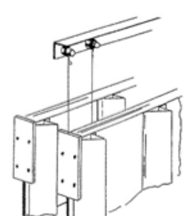


Principle: Electrodes at high voltage create a corona effect (ionized atmosphere) surrounding them. This charges the passing particles. Once charged, particles are subject to a transverse electrostatic force that pulls them toward the collecting plates. Plates are periodically "rapped" (vibrated) to make the collected particles fall down into a receiver basket in the bottom of the apparatus.

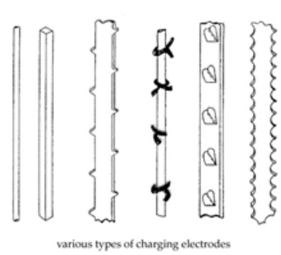
Various types of
charging electrodes
and collecting plates

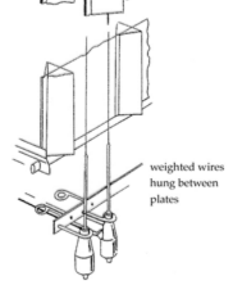






The baffles along the
collecting plates are there
to catch better the drifting
particles.





Note the indentations and
sharp corners on some of
the electrodes. These are
designed to enhance the
corona effect.

Drift speed

The particle drift speed (w_e) results from a balance between the electrostatic force due to the charge (F_e) and the resisting drag force (F_d) exerted by the air due the relative motion between air and particle.

For the drag force, we assume that the particles are very small. (The purpose of an ESP is precisely to catch very small particles!). So, we use Stokes' Law with the Cunningham Slip factor correction (refer to slide in lecture on Transport Phenomena).

$$F_e = \text{electrostatic force} = \text{charge} \times \text{electric field} = qE$$

$$F_d = \text{drag force} = \frac{3\pi\mu_f d_p w_e}{C_c}$$

$$F_d = F_e \quad \Rightarrow \quad \frac{3\pi\mu_f d_p w_e}{C_c} = qE \quad \Rightarrow \boxed{w_e = \frac{C_c qE}{3\pi\mu_f d_p}}$$

where
q = charge acquired by each particle
E = electrical field = voltage difference divided by electrode-plate distance d
C_c = Cunnigham slip factor (to be obtained from graph or formula)
μ_f = fluid viscosity = 1.81 x 10^{-5} kg/m.s for air at ambient temperature
d_p = particle diameter

The charge q acquired by a particle is a certain number times the charge of the electron, which is 1.6 x 10^{-19} C.

So, for example, if a particle acquires 12 electrons, its charge is:

q = 12 x 1.6 x 10^{-19} C = 1.92 x 10^{-18} C.

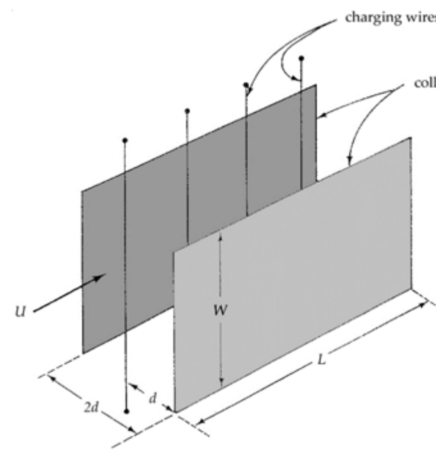
The number of electrons acquired depends on the intensity of the corona generated around the electrodes, and this is proportional to the electrical field E. Thus, q is proportional to E, making the electrical force qE proportional to E^2.

It follows that the drift speed w_e, too, is proportional to the square of the electrical field. This is a useful amplification of the effect.

A rule to determine the charge acquired by a particle is:

$$q = \pi d_p^2 \, \varepsilon_0 \frac{3\varepsilon}{2+\varepsilon} E_{ch}$$

where
ε_0 = 8.85 x 10^{-12} C/V.m = permittivity of vacuum
$\varepsilon \approx 3.7$ = dielectric constant for the particle relative to vacuum
E_{ch} = charging field strength (in V/m), different from collecting field.



Nomenclature:

U = speed of air flow
d = electrode-plate distance
= half of plate separation distance
W = plate width (height)
L = plate length

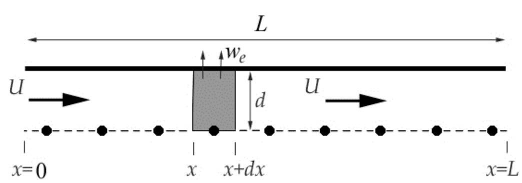
Budget for an interval (x, $x+dx$) along the flow, and between electrode and plate (distance d) and for the full width W of the plate:

$$V\cancel{\frac{dC}{dt}} = Q_{upstream}C_{upstream} - Q_{downstream}C_{downstream} - Q_{drift}C_{drift}$$

steady state

where each volumetric flowrate Q is the product of a velocity with the respective cross-sectional area:

$$Q_{upstream} = UWd$$
$$Q_{downstream} = Q_{upstream} = UWd$$
$$Q_{drift} = w_e W dx$$



The budget then becomes:

$$0 = (UWd)C(x) - (UWd)C(x+dx) - (w_e W dx)C\left(x + \frac{dx}{2}\right)$$

This budget equation can be rewritten as

$$(Ud)\frac{C(x+dx)-C(x)}{dx} = -w_e C\left(x+\frac{dx}{2}\right)$$

In the limit of $dx \to 0$, we obtain the differential equation

$$Ud\,\frac{dC}{dx} = -\,w_e\,C(x) \quad \Rightarrow \quad \frac{dC}{dx} = -\frac{w_e}{Ud}\,C$$

The solution of which is

$$C(x) = C(x=0)\,e^{-w_e x/Ud}$$

With $C(x=0) = C_{in}$ and
writing the solution for the end point $x = L$ where $C(x = L) = C_{out}$,
we obtain

$$C(x=L) = C(x=0)\,e^{-w_e L/Ud} \quad \Rightarrow \quad C_{out} = C_{in}\,e^{-w_e L/Ud}$$

Efficiency

The efficiency η is defined as the percentage of removal.
We find it to be:

$$\eta = \frac{\text{amount removed}}{\text{amount entering}} = \frac{C_{in}-C_{out}}{C_{in}} = 1-\frac{C_{out}}{C_{in}}$$

$$= 1-\exp\left(-\frac{w_e\,L}{U\,d}\right)$$

Since the flow speed U is the volumetric flow Q of air divided by the cross-sectional area Wd, we can also write the efficiency as:

$$\eta = 1-\exp\left(-\frac{w_e WL}{Q}\right) = 1-\exp\left(-\frac{w_e A}{Q}\right)$$

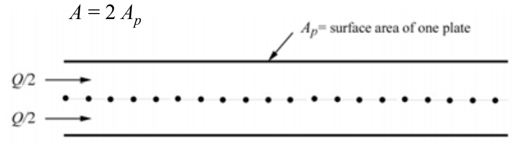
where $A=WL$ is the collecting plate area.

Dividing the total collecting area in a set of plates

<u>One passage between two plates</u>:

$$\eta = 1 - \exp\left(-\frac{w_e A_p}{Q/2}\right)$$
$$= 1 - \exp\left(-\frac{w_e (2A_p)}{Q}\right)$$
$$= 1 - \exp\left(-\frac{w_e A}{Q}\right)$$

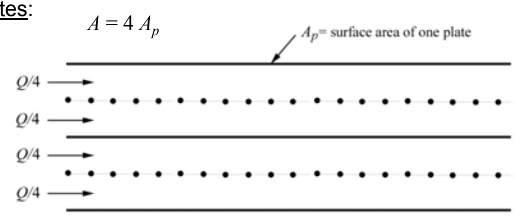
$A = 2\ A_p$



<u>Two passages between three plates</u>:

$$\eta = 1 - \exp\left(-\frac{w_e A_p}{Q/4}\right)$$
$$= 1 - \exp\left(-\frac{w_e (4A_p)}{Q}\right)$$
$$= 1 - \exp\left(-\frac{w_e A}{Q}\right)$$

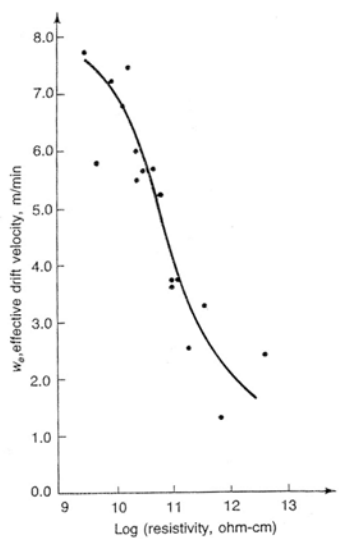
$A = 4\ A_p$



etc. with more plates.
In all cases, A in the formula stands for the total plate collecting area.

Effect of fly-ash resistivity on effective drift velocity in an electrostatic precipitator

Particles of high electrical resistivity lose their charge slowly after hitting the collecting plate. This creates an electrical shield on the plates that lowers the ambient electric field.
As a result, particles of high electrical resistivity drift more slowly and are harder to collect.



SOURCE: Adapted from White, "Control of Particulates by Electrostatic Precipitation," *Handbook of Air Pollution Technology*. Copyright © 1984 by John Wiley & Sons, Inc.

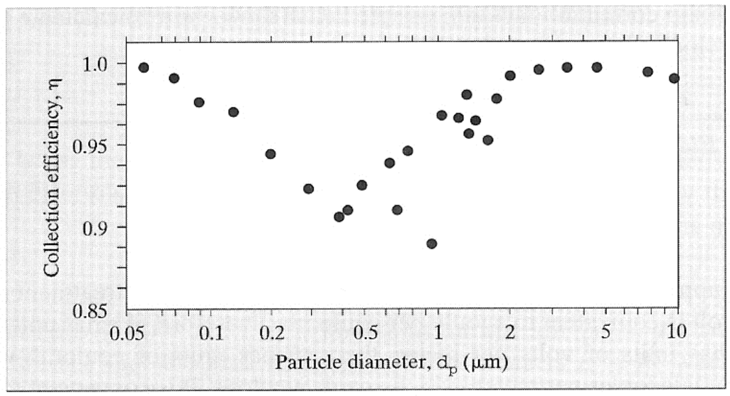


Figure 7.C.4 Measured collection efficiency as a function of particle size for an electrostatic precipitator installed on a pulverized coal boiler. (Reprinted with permission of the Air & Waste Management Association from J.D. McCain et al. [1975].)

(Nazaroff & Alvarez-Cohen, Figure 7.C.4)

Larger particles are removed more efficiently because they acquire a greater electric charge, whereas smaller particles, too, are removed more efficiently because they are subjected to less drag and thus drift more easily, leaving intermediate particles as those that are less efficiently collected. Nonetheless, efficiency easily exceeds 90% for most particles.

An example

Given situation

Airflow Q = 2,000 m^3/min
Particle diameter d_p = 0.5 μm
Average particle charge q = 10 electron charges
Electric field E = 50,000 V/m
Each plate has dimensions 6 m by 3 m.

Design requirement Device must achieve an efficiency of 99%.

Solution

One-micron particles are quite small. So, we include the correction due to the Cunningham slip factor:

$$C_c = 1 + \frac{\lambda_g}{d_p}\left[2.51 + 0.80\exp\left(-\frac{0.55 d_p}{\lambda_g}\right)\right]$$

With λ = 0.066 μm and d_p = 0.5 μm, we get C_c = 1.333.

Next, we calculate the electric charge on each particle. It is

q = 10 e = 10 x 1.6 10^{-19} C = 1.6 x 10^{-18} C

The drift speed can now be estimated:

$$w_e = \frac{qEC_c}{3\pi\mu\, d_p} = \frac{(1.6\times 10^{-18}\,\mathrm{C})(5\times 10^{4}\,\mathrm{V/m})(1.333)}{(3\pi)(1.81\times 10^{-5}\,\mathrm{kg/m.s})(0.5\times 10^{-6}\,\mathrm{m})} = 1.250\times 10^{-3}\ \mathrm{m/s}$$

(Note how small the drift speed actually is, about 15 ft per hour...)

For an efficiency of 99% (η = 0.99), we must have

$$\exp\left(-\frac{A\,w_e}{Q}\right) = 1 - 0.99 = 0.01 \quad\Rightarrow\quad \frac{A\,w_e}{Q} = 4.61$$

With Q given (= 2000 m^3/min = 33.33 m^3/s) and w_e already determined, we can deduce the needed collecting area A:

$$A = \frac{(4.61)\,(33.33\,\mathrm{m}^3/\mathrm{s})}{(1.250\times 10^{-3}\ \mathrm{m/s})} = 122{,}783\,\mathrm{m}^2$$

Since a single plate offers a collecting area of 2 x 6 x 3 = 36 m^2 (counting both sides), the required number of plates is

$$n = \frac{122{,}783\,\mathrm{m}^2}{36\,\mathrm{m}^2} + 1 = 3{,}412$$

(*Note*: Need to add 1 because each of the two terminal plates offers only a single collecting side.)

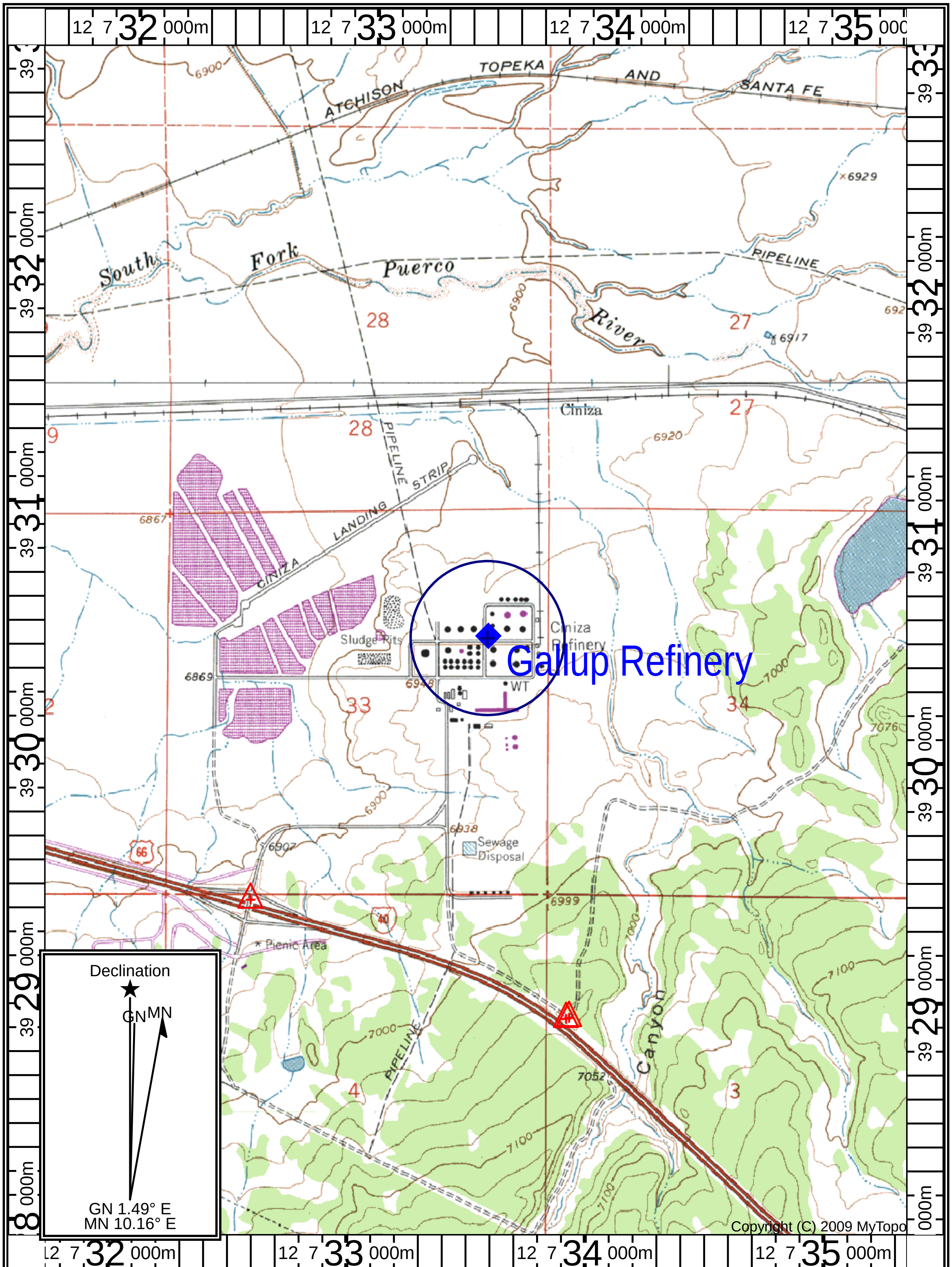
Section 8

Map(s)

A map such as a 7.5-minute topographic quadrangle showing the exact location of the source. The map shall also include the following:

The UTM or Longitudinal coordinate system on both axes	An indicator showing which direction is north
A minimum radius around the plant of 0.8km (0.5 miles)	Access and haul roads
Topographic features of the area	Facility property boundaries
The name of the map	The area which will be restricted to public access
A graphical scale	

The map for this facility is attached on the following page.



Map Name: CINIZA
Print Date: 09/11/14

Scale: 1 inch = 2,000 ft.
Map Center: 12 0733474 E 39304

Horizontal Datum: WGS84

Section 9

Proof of Public Notice

(for NSR applications submitting under 20.2.72 or 20.2.74 NMAC)
(This proof is required by: 20.2.72.203.A.14 NMAC "Documentary Proof of applicant's public notice")

☑ **I have read the AQB "Guidelines for Public Notification for Air Quality Permit Applications"**
This document provides detailed instructions about public notice requirements for various permitting actions. It also provides public notice examples and certification forms. Material mistakes in the public notice will require a re-notice before issuance of the permit.

Unless otherwise allowed elsewhere in this document, the following items document proof of the applicant's Public Notification. Please include this page in your proof of public notice submittal with checkmarks indicating which documents are being submitted with the application.

New Permit and **Significant Permit Revision** public notices must include all items in this list.

Technical Revision public notices require only items 1, 5, 9, and 10.

Per the Guidelines for Public Notification document mentioned above, include:

1. ☐ A copy of the certified letter receipts with post marks (20.2.72.203.B NMAC)
2. ☐ A list of the places where the public notice has been posted in at least four publicly accessible and conspicuous places, including the proposed or existing facility entrance. (e.g: post office, library, grocery, etc.)
3. ☐ A copy of the property tax record (20.2.72.203.B NMAC).
4. ☐ A sample of the letters sent to the owners of record.
5. ☐ A sample of the letters sent to counties, municipalities, and Indian tribes.
6. ☐ A sample of the public notice posted and a verification of the local postings.
7. ☐ A table of the noticed citizens, counties, municipalities and tribes and to whom the notices were sent in each group.
8. ☐ A copy of the public service announcement (PSA) sent to a local radio station and documentary proof of submittal.
9. ☐ A copy of the classified or legal ad including the page header (date and newspaper title) or its affidavit of publication stating the ad date, and a copy of the ad. When appropriate, this ad shall be printed in both English and Spanish.
10. ☐ A copy of the display ad including the page header (date and newspaper title) or its affidavit of publication stating the ad date, and a copy of the ad. When appropriate, this ad shall be printed in both English and Spanish.
11. ☐ A map with a graphic scale showing the facility boundary and the surrounding area in which owners of record were notified by mail. This is necessary for verification that the correct facility boundary was used in determining distance for notifying land owners of record.

N/A – Not required for a Title V Renewal Application.

Section 10

Written Description of the Routine Operations of the Facility

---

A written description of the routine operations of the facility. Include a description of how each piece of equipment will be operated, how controls will be used, and the fate of both the products and waste generated. For modifications and/or revisions, explain how the changes will affect the existing process. In a separate paragraph describe the major process bottlenecks that limit production. The purpose of this description is to provide sufficient information about plant operations for the permit writer to determine appropriate emission sources.

The facility is a refinery with a processing capacity of approximately 32,000 barrels per day (bpd) of crude oil and other feedstock. The Gallup Refinery consists of refinery operations (Western Refining Southwest, Inc.) and storage and terminal operations (Western Refining Terminals, LLC).

Gallup Refinery includes the following units:

- A Crude Distillation Unit (CRUDE)
- A Fluid Catalytic Cracking Unit (FCCU) with an Electrostatic Precipitator (ESP) for PM emission control
- A Reforming Unit (PLAT)
- An Alkylation Unit (ALKY)
- A Saturated Gas Unit (SATS)
- A Gas Concentration Unit (GASCON)
- Distillate hydrotreating (DHT) for Ultra Low Sulfur Diesel (ULSD), Kerosene hydrotreating (KHT), and Naphtha Hydrotreating (NHT) units
- AMINE closed loop system and Sour Water Stripper (SWS) system, emission point TV-1 (SWAATS as shown in Table 10-3).
- A Sulferox Sulfur Recovery Unit (SRU)
- A Sour Water Ammonia Ammonium Thiosulfate Solution (SWAATS) gas processing unit
- Wastewater treatment system
- Storage tanks
- Truck loading racks
- Rail loading rack
- Flare

Crude oil entering the facility is received into crude oil storage tanks. Oil from the tanks is first piped to the crude distillation unit, where it is separated into fractions including gas, naphtha, light oil, heavy oil, and residual fuel. The FCCU breaks up (cracks) long-chain hydrocarbon molecules in the heavy oil and residual into smaller molecules, effectively converting these heavy compounds into naphtha, gasoline, and light products such as liquefied petroleum gas (LPG). The LPG is conveyed to the alkylation unit where it and other light fractions are combined to form high octane gasoline blending component. The ESP unit controls particulate matter emitted at the FCCU unit.

The reforming unit combines low octane naphtha molecules to form high octane naphtha. The hydrotreating units remove undesirable sulfur and nitrogen compounds from intermediate feedstocks, and also saturate the feedstocks with hydrogen.

Fuel gas collected from various refinery units are treated to remove sulfur then used as fuel source for combustion devices at the refinery. Acid gas from Amine and SWS is sent to the SWAATS gas processing unit or the Sulferox sulfur recovery unit where the sulfur is removed, resulting in a clean-burning gas used as refinery fuel gas. The Sulferox sulfur recovery unit and the SWAATS gas processing unit convert and recover various sulfur compounds from other processing units, producing a solid elemental sulfur byproduct (Sulferox) and an ammonium thiosulfate solution byproduct (SWAATS). Process heaters are used throughout the facility to directly heat the various process streams in these process units, and boilers and cogeneration units (turbines/boilers) are used to supply indirect heating for process and space heating.

With these process units and activities, the facility produces a range of petroleum products including propane, butane, unleaded gasoline, diesel fuel, kerosene, and residual fuel.

Storage tanks are used throughout the refinery to hold crude oil, natural gasoline, intermediate feedstocks, finished products, chemicals, and water. These tanks are all above-ground tanks ranging in size from 80,000 barrels to less than 1,000 barrels.

Gallup Refinery is a zero wastewater discharge facility. The mechanical evaporators (SM-1, SM-2, EV-3, & EV-4) by the evaporation ponds allow the refinery to achieve zero discharge during rainy seasons with the existing surface impoundment capacity.

Pumps, valves, and piping systems are used throughout the refinery to transfer liquids among tanks and processing units. Finished products are transferred out, and raw materials including crude oil, feedstocks, chemicals, and additives are transferred in via truck loading terminals and railcar loading racks.

Tables 10-1 through 10-4, on the following page, provide lists of sources/equipment currently covered under the site NSR and Title V permits that are operated by the Western Refining Terminals, LLC and Western Refining Southwest, Inc.

Table 10-1. Equipment owned by Western Refining Terminals, LLC

Unit No.	Source Description
FUG-L	Fugitives associated with TK-L, TRUCK, and RAIL
TRUCK	Truck Loading Rack Controlled by VRU
RAIL	Rail Car Loading & Unloading Rack controlled by flare FL-1
TK-L	Storage Tanks (see Table 10-2)

Table 10-2. Tanks owned by Western Refining Terminals, LLC (unit TK-L)

Unit No.	
T-1	T-342
T-2	T-343
T-3	T-344
T-4	T-345
T-5	T-567
T-6	T-569
T-7	T-570
T-8	T-571
T-101	T-572
T-102	T-574
T-106	T-575
T-107	T-576
T-108	T-577
T-111	T-579
T-112	T-581
T-115	T-582
T-116	T-583
T-225	T-701
T-226	T-702
T-227	T-703
T-228	T-704
T-231	T-705
T-232	T-706
T-235	T-707
T-337	T-714
T-338	

Table 10-3. Equipment owned by Western Refining Southwest, Inc.

Unit No.	Source Description
Z-81-B104	Steam Boiler (part of cogen unit)
Z-81-G104	Gas Turbine (part of cogen unit)
Z-81-B105	Steam Boiler (part of cogen unit)
Z-81-G105	Gas Turbine (part of cogen unit)
Z-81-B102	Boiler
Z-81-B106	Boiler
FB-1	CO Boiler (Replacement Unit)
GC-1A	Gas Compressor Engine (RICE)
GC-1B	Gas Compressor Engine (RICE)
GC-1C	Gas Compressor Engine (RICE)
PC-1B	Gas Compressor Engine (RICE)
C-H1 (Low-NO_x)	Furnace
C-H2	Furnace
C-H5 (Low-NO_x)	Furnace
H-F1	Furnace
H-F2	Furnace
P-H1 (dual stacks)	Furnace
P-H2 (Low-NO_x)	Furnace
A-H2	Furnace
FL-1	Smokeless Flare
D-H2	Vertical/cylindrical ultra low sulfur DHT feed heater
D-H3	Vertical/cylindrical trickle bed reactor feed heater with two Low NOx burners
CT-1/2	Cooling Towers
D-H1A (Low-NO_x)	Furnace
SM-1	Electrically-Driven Evaporation Pond Spraying Snow Machine
SM-2	Electrically-Driven Evaporation Pond Spraying Snow Machine
FUG-R	Fugitives associated with process units owned by Western Refining Southwest, Inc.
AM	Amine Unit
TV-1 (SWAATS)	Sour Water Amine Ammonium Thiosulfate Solution (SWAATS) Gas Processing Unit
SWS	Sour Water Stripper
WWS	Wastewater Treatment System (including API oil water separator, DGF System, and MPPE System)
TK-R	Storage Tanks (Table 2-2)
DHT	Distillate Hydrotreating Unit
KHT	Kerosene Hydrotreating Unit
FCCU	Fluid Catalytic Cracking Unit
PLAT	Platformer
SRU	Sulferox Sulfur Recovery Unit
SATS	Saturates Gas Unit
CRUDE	Crude Distillation Unit
ALKY De-inventory Pressure Vessel	HF Pressure Vessel
GASCON	Gas Concentration Unit
ALKY	Alkylation Unit

Unit No.	Source Description
Passive Bio-remediation	Vent Systems for ULSD Spills (various locations)
ESP	Electrostatic Precipitator, Dry Plate
EV-3	Wastewater evaporator/ sprayer
EV-4	Wastewater evaporator/ sprayer
EG-2	Emergency Generator (RICE)
EG-3	Emergency Generator (RICE)
EG-4	Emergency Generator (RICE)
EG-6	Emergency Generator (RICE)
Z-86-P2	Fire Pump (RICE)
Z-91-DE10	Fire Pump (RICE)
AC-8	Emergency Air Compressor (RICE)
AC-12	Emergency Air Compressor (RICE)
BENSAT	Naphtha Splitter
GEN-1	Diesel Generator
FW-1	Fire Pump (RICE)
FW-2	Fire Pump (RICE)

Table 10-4. Tanks owned by Western Refining Southwest, Inc. (unit TK-R)

Unit No.	
SWS-TK1	Chevron
AM-TK1	Western
Z-81-T9	Texaco
Z-81-T13	Conoco
Z-81-T14	Exxon
Z-81-T15	Total
Z-83-T3	Mobil
O.C. Diesel	Shell
O.C. Gasoline	Amoco
Fire Pump	
Z84-T35	
T27	
T28	

Section 11

Source Determination

Source submitting under 20.2.70, 20.2.72, 20.2.73, and 20.2.74 NMAC

Sources applying for a construction permit, PSD permit, or operating permit shall evaluate surrounding and/or associated sources (including those sources directly connected to this source for business reasons) and complete this section. Responses to the following questions shall be consistent with the Air Quality Bureau's permitting guidance, Single Source Determination Guidance, which may be found on the Applications Page in the Permitting Section of the Air Quality Bureau website.

Typically, buildings, structures, installations, or facilities that have the same SIC code, that are under common ownership or control, and that are contiguous or adjacent constitute a single stationary source for 20.2.70, 20.2.72, 20.2.73, and 20.2.74 NMAC applicability purposes. Submission of your analysis of these factors in support of the responses below is optional, unless requested by NMED.

A. Identify the emission sources evaluated in this section (list and describe)**:**
See Table 2-A.

B. Apply the 3 criteria for determining a single source:

SIC Code: Surrounding or associated sources belong to the same 2-digit industrial grouping (2-digit SIC code) as this facility, OR surrounding or associated sources that belong to different 2-digit SIC codes are support facilities for this source.

☒ **Yes** ☐ **No**

Common Ownership or Control: Surrounding or associated sources are under common ownership or control as this source.

☒ **Yes** ☐ **No**

Contiguous or Adjacent: Surrounding or associated sources are contiguous or adjacent with this source.

☒ **Yes** ☐ **No**

C. Make a determination:

☒ The source, as described in this application, constitutes the entire source for 20.2.70, 20.2.72, 20.2.73, or 20.2.74 NMAC applicability purposes. If in "A" above you evaluated only the source that is the subject of this application, all "**YES**" boxes should be checked. If in "A" above you evaluated other sources as well, you must check **AT LEAST ONE** of the boxes "**NO**" to conclude that the source, as described in the application, is the entire source for 20.2.70, 20.2.72, 20.2.73, and 20.2.74 NMAC applicability purposes.

☐ The source, as described in this application, **does not** constitute the entire source for 20.2.70, 20.2.72, 20.2.73, or 20.2.74 NMAC applicability purposes (A permit may be issued for a portion of a source). The entire source consists of the following facilities or emissions sources (list and describe):

Section 12

Section 12.A

PSD Applicability Determination for All Sources

(Submitting under 20.2.72, 20.2.74 NMAC)

A PSD applicability determination for all sources. For sources applying for a significant permit revision, apply the applicable requirements of 20.2.74.AG and 20.2.74.200 NMAC and to determine whether this facility is a major or minor PSD source, and whether this modification is a major or a minor PSD modification. It may be helpful to refer to the procedures for Determining the Net Emissions Change at a Source as specified by Table A-5 (Page A.45) of the EPA New Source Review Workshop Manual to determine if the revision is subject to PSD review.

A. This facility is:

- ☐ **a minor PSD source before and after this modification (if so, delete C and D below).**
- ☐ **a major PSD source before this modification. This modification will make this a PSD minor source.**
- ☑ **an existing PSD Major Source that has never had a major modification requiring a BACT analysis.**
- ☐ **an existing PSD Major Source that has had a major modification requiring a BACT analysis**
- ☐ **a new PSD Major Source after this modification.**

B. **This facility is one of the listed 20.2.74.501 Table I – PSD Source Categories. The "project" emissions** for this modification are **not significant. The "project" emissions listed below only result from changes described in this permit application, thus no emissions from other revisions or modifications, past or future to this facility. Also, specifically discuss whether this project results in "de-bottlenecking", or other associated emissions resulting in higher emissions. The project emissions (before netting) for this project are as follows [see Table 2 in 20.2.74.502 NMAC for a complete list of significance levels]:**

This is a Title V Renewal Application; therefore, there are no significant modifications to emissions.

a. **NOx: ---- TPY**
b. **CO: ---- TPY**
c. **VOC: ---- TPY**
d. **SOx: ---- TPY**
e. **TSP (PM): ---- TPY**
f. **PM10: ---- TPY**
g. **PM2.5: ---- TPY**
h. **Fluorides: ---- TPY**
i. **Lead: ---- TPY**
j. **Sulfur compounds (listed in Table 2): ---- TPY**
k. **GHG: ---- TPY**

C. **Netting is not required (project is not significant). No debottlenecking will result from the proposed modification**

D. **BACT** is **not required for this modification, as this application is a minor modification.**

E. If this is an existing PSD major source, or any facility with emissions greater than 250 TPY (or 100 TPY for 20.2.74.501 Table 1 – PSD Source Categories), determine whether any permit modifications are related, or could be considered a single project with this action, and provide an explanation for your determination whether a PSD modification is triggered.

Section 13

Determination of State & Federal Air Quality Regulations

This section lists each state and federal air quality regulation that may apply to your facility and/or equipment that are stationary sources of regulated air pollutants.

Not all state and federal air quality regulations are included in this list. Go to the Code of Federal Regulations (CFR) or to the Air Quality Bureau's regulation page to see the full set of air quality regulations.

Required Information for Specific Equipment:
For regulations that apply to specific source types, in the 'Justification' column **provide any information needed to determine if the regulation does or does not apply**. **For example**, to determine if emissions standards at 40 CFR 60, Subpart IIII apply to your three identical stationary engines, we need to know the construction date as defined in that regulation; the manufacturer date; the date of reconstruction or modification, if any; if they are or are not fire pump engines; if they are or are not emergency engines as defined in that regulation; their site ratings; and the cylinder displacement.

Required Information for Regulations that Apply to the Entire Facility:
See instructions in the 'Justification' column for the information that is needed to determine if an 'Entire Facility' type of regulation applies (e.g. 20.2.70 or 20.2.73 NMAC).

Regulatory Citations for Regulations That Do Not, but Could Apply:
If there is a state or federal air quality regulation that does not apply, but you have a piece of equipment in a source category for which a regulation has been promulgated, you must **provide the low level regulatory citation showing why your piece of equipment is not subject to or exempt from the regulation. For example,** if you have a stationary internal combustion engine that is not subject to 40 CFR 63, Subpart ZZZZ because it is an existing 2 stroke lean burn stationary RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions, your citation would be 40 CFR 63.6590(b)(3)(i). **We don't want a discussion of every non-applicable regulation, but if it is possible a regulation could apply, explain why it does not. For example,** if your facility is a power plant, you do not need to include a citation to show that 40 CFR 60, Subpart OOO does not apply to your non-existent rock crusher.

Regulatory Citations for Emission Standards:
For each unit that is subject to an emission standard in a source specific regulation, such as 40 CFR 60, Subpart OOO or 40 CFR 63, Subpart HH, include the low-level regulatory citation of that emission standard. Emission standards can be numerical emission limits, work practice standards, or other requirements such as maintenance. **Here are examples:** a glycol dehydrator is subject to the general standards at 63.764C(1)(i) through (iii); an engine is subject to 63.6601, Tables 2a and 2b; a crusher is subject to 60.672(b), Table 3 and all transfer points are subject to 60.672(e)(1)

Federally Enforceable Conditions:
All federal regulations are federally enforceable. All Air Quality Bureau State regulations are federally enforceable except for the following: affirmative defense portions at 20.2.7.6.B, 20.2.7.110(B)(15), 20.2.7.11 through 20.2.7.113, 20.2.7.115, and 20.2.7.116; 20.2.42; 20.2.43; 20.2.62; 20.2.63; 20.2.86; 20.2.89; and 20.2.90 NMAC. Federally enforceable means that EPA can enforce the regulation as well as the Air Quality Bureau and federally enforceable regulations can count toward determining a facility's potential to emit (PTE) for the Title V, PSD, and nonattainment permit regulations.

INCLUDE ANY OTHER INFORMATION NEEDED TO COMPLETE AN APPLICABILITY DETERMINATION OR THAT IS RELEVENT TO YOUR FACILITY'S NOTICE OF INTENT OR PERMIT.

EPA Applicability Determination Index for 40 CFR 60, 61, 63, etc: http://cfpub.epa.gov/adi/

State and federal rule applicability for the sources affected by this permitting action is summarized in the tables on the following page.

Table for STATE REGULATIONS:

STATE REGU-LATIONS CITATION	Title	Applies? Enter Yes or No	Unit(s) or Facility	JUSTIFICATION:
20.2.1 NMAC	General Provisions	Yes	Entire Facility	General Provisions apply to Notice of Intent, Construction, and Title V permit applications.
20.2.3 NMAC	Ambient Air Quality Standards NMAAQS	Yes	N/A	20.2.3 NMAC is a SIP approved regulation that limits the maximum allowable concentration of Sulfur Compounds, Carbon Monoxide and Nitrogen Dioxide.
20.2.7 NMAC	Excess Emissions	Yes	Entire Facility	All Title V major sources are subject to Air Quality Control Regulations, as defined in 20.2.7 NMAC, and are thus subject to the requirements of this regulation. Also listed as applicable in NSR Permit 0633-M11.
20.2.33 NMAC	Gas Burning Equipment - Nitrogen Dioxide	No	N/A	No affected equipment at facility.
20.2.34 NMAC	Oil Burning Equipment: NO2	No	N/A	No affected equipment at facility.
20.2.38 NMAC	Hydrocarbon Storage Facil.	Yes	TK-R	Some tanks at the facility have the potential to be subject to 20.2.38.109 NMAC. 20.2.38 potential applicability for facility storage tanks are provided in Table 13-B, below.
20.2.38 NMAC	Hydrocarbon Storage Facil.	Yes	TK-L	Some tanks at the facility have the potential to be subject to 20.2.38.109 NMAC. 20.2.38 potential applicability for facility storage tanks are provided in Table 13-C, below.
20.2.39 NMAC	Sulfur Recovery Plant - Sulfur	No	N/A	Not applicable as the facility does not contain a sulfur recovery plant which is not part of a petroleum processing facility.
20.2.70 NMAC	Operating Permits	Yes	Entire Facility	Gallup Refinery is major for criteria pollutants and HAPs and has been issued operating Permit P021-R3.
20.2.71 NMAC	Operating Permit Fees	Yes	N/A	This facility is subject to 20.2.70 NMAC and is in turn subject to 20.2.71 NMAC.
20.2.72 NMAC	Construction Permits	Yes	N/A	This facility is subject to 20.2.72 NMAC and has been issued NSR Permit number 0633-M16R1.
20.2.73 NMAC	NOI & Emissions Inventory Requirements	Yes	N/A	Emissions Inventory Reporting: 20.2.73.300 NMAC applies. All Title V major sources meet the applicability requirements of 20.2.73.300 NMAC.
20.2.74 NMAC	Permits – PSD	Yes	N/A	This facility is listed in Table 1 of 20.2.74.501 NMAC and has emissions greater than one hundred (100) tons per year of any regulated pollutant. However, this action is not a “major modification” as defined by regulation. PSD permitting requirements do not apply.
20.2.75 NMAC	Construction Permit Fees	Yes	N/A	This facility is subject to 20.2.72 NMAC and is in turn subject to 20.2.75 NMAC.

STATE REGU-LATIONS CITATION	**Title**	**Applies? Enter Yes or No**	**Unit(s) or Facility**	**JUSTIFICATION:**
20.2.77 NMAC	New Source Performance	Yes	See units subject to 40 CFR Part 60	These are stationary sources which are subject to the requirements of 40 CFR Part 60, Subparts A, Dc, J, Ja, K, Kb, GG, GGG, GGGa, QQQ and IIII.
20.2.78 NMAC	Emission Standards for HAPS	Yes	See units subject to 40 CFR Part 61	This facility emits hazardous air pollutants which are subject to the requirements of 40 CFR Part 61, Subparts A and FF.
20.2.79 NMAC	Permits – Nonattainment Areas	No	N/A	This facility is not subject to this regulation as it is not located in a nonattainment area. See below for the applicability criteria as given in 20.2.79.109 NMAC: **(2)** The major stationary source or major modification will be located within an area designated attainment or unclassifiable pursuant to Section 107 of the Federal Act and will emit a regulated pollutant for which it is major and the ambient impact of such pollutant would exceed any of the significance levels in 20.2.79.119.A NMAC at any location that does not meet any national ambient air quality standard for the same pollutant. (See 20.2.79.109.D NMAC)
20.2.80 NMAC	Stack Heights	No	N/A	There are no stacks at the facility whose height exceeds GEP.
20.2.82 NMAC	MACT Standards for source categories of HAPS	Yes	See units subject to 40 CFR Part 63	This facility emits hazardous air pollutants and is subject to the requirements of 40 CFR Part 63, Subparts A, CC, UUU, EEEE, ZZZZ, DDDDD, and GGGGG.

Table for Applicable FEDERAL REGULATIONS

FEDERAL REGU-LATIONS CITATION	**Title**	**Applies? Enter Yes or No**	**Unit(s) or Facility**	**JUSTIFICATION:**
40 CFR 50	NAAQS	Yes	N/A	Defined as applicable at 20.2.70.7.E(11) NMAC: “Any national ambient air quality standard.”
NSPS 40 CFR 60, Subpart A	General Provisions	Yes	See units subject to NSPS Subparts	See applicability justifications below for 40 CFR 60.
NSPS 40 CFR60.40 a, Subpart Da	Subpart Da, Performance Standards for Electric Utility Steam Generating Units	No	N/A	The facility does not have any Steam Generating Units with heat input > 250 MMBtu/hr.
NSPS 40 CFR60.40b Subpart Db	Industrial-Commercial- Inst. Steam Generating Units	No	N/A	The facility does not have any Steam Generating Units with heat input > 100 MMBtu/hr.
NSPS 40 CFR60.40c Subpart Dc	Small Industrial-Commercial- Inst. Steam Generating Units	No	Z-81-B104, B105 and B106; F-B1	The affected units (*steam generating units*) were constructed after the applicability date and are > 10 MMBtu/hr but less than 100 MMBTU/hr heat input. These units burn only gaseous fuels and only have recordkeeping requirements under this subpart. Unit Z-81- B102 was constructed before the applicability date (June 9, 1989) for this subpart and has not been modified or reconstructed after the applicability date.

FEDERAL REGU-LATIONS CITATION	Title	Applies? Enter Yes or No	Unit(s) or Facility	JUSTIFICATION:
				Steam generating units do not include process heaters as defined in §60.41c.
NSPS 40 CFR60 Subpart J	Petroleum Refineries	Yes	Z-81-B102, Z-81-B104, Z-81-B105, A-H2, C-H1, C-H2, C-H5, D-H1A, D-H2, D-H3, H-F1, H-F2, P-H1, P-H2	Stipulated Final Order (SFO) Section IX.B and IX.C state that Subpart J applies to all heaters and boilers. The process unit FCCU (catalytic cracking unit) was constructed before the applicability date (June 11, 1973) and has not been reconstructed or modified since that date; there are no requirements for the FCCU under this subpart. Note that subject to the terms of Section VII of the SFO, Western shall accept NSPS Subparts A and J applicability at the Gallup Refinery FCCU as provided in Section VII of the SFO. *Western requests a clarification to the averaging period for Carbon Monoxide emissions (500 ppm) from the FCCU found in Condition A106.E to specify '1-hour average' as described in 40 CFR 60.105(e)(2).*
NSPS 40 CFR60 Subpart Ja	Standards of Performance for Petroleum Refineries for Which Construction, Reconstruction, or Modification Commenced After May 14, 2007	Yes	Z-81-B106, F-B1, FL-1	Unit Z-81-B106 and replacement unit F-B1 are subject to NSPS Ja. The process unit FCCU (catalytic cracking unit) was constructed before the applicability date (May 14, 2007) and has not been reconstructed or modified since that date; there are no requirements for the FCCU under this subpart. This regulation applies to: FB-1 is a fuel gas combustion device, which is an affected source, that was constructed, reconstructed, or modified after May 14, 2007.
NSPS 40 CFR 60, Subpart K	Storage Vessels for Petroleum Liquids for which Construction, Reconstruction, or Modification Commenced After June 11, 1973, and Prior to May 19, 1978.	No	TK-L (T-337, T-345)	This facility has storage vessels with a capacity greater than or equal to 40,000 gal that are used to store petroleum liquids for which construction, reconstruction, or modification commenced after June 11, 1973, but before May 19, 1978. NSPS K potential applicability is provided in NSR permit 0633-M11.
NSPS 40 CFR 60, Subpart Ka	Standards of Performance for Storage Vessels for Petroleum Liquids for which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and Prior to July 23, 1984	No	N/A	There are currently no tanks at the facility subject to this part.
NSPS 40 CFR 60, Subpart Kb	Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or	Yes	TK-R, TK-L (T-27, T-28, Z84-T35, T-7, T-102, T-344)	This facility has storage vessels with a capacity greater than or equal to 75 cubic meters (m 3) that are used to store volatile organic liquids (VOL) for which construction, reconstruction, or modification commenced after July 23, 1984.

FEDERAL REGU-LATIONS CITATION	Title	Applies? Enter Yes or No	Unit(s) or Facility	JUSTIFICATION:
	Modification Commenced After July 23, 1984			
NSPS 40 CFR 60.330 Subpart GG	Stationary Gas Turbines	Yes	Z-81-G104 & G105	These units have a heat input of 32 MMBtu/hour and were installed in 1990 which is after the applicability date for this part (October 3, 1977).
NSPS 40 CFR 60, Subpart VV	Leaks of VOC in Synthetic Organic Chemicals Manufacturing (Construction, Reconstruction, or Modification commenced after January 5, 1981 and on or before November 7, 2006)	No	N/A	This subpart sets performance standards for affected facilities under Subpart GGG; however, the equipment is not an affected facility under Subpart VV.
NSPS 40 CFR 60, Subpart VVa	Leaks of VOC in Synthetic Organic Chemicals Manufacturing (Construction, Reconstruction, or Modification commenced after November 7, 2006)	No	N/A	This subpart sets performance standards for affected facilities under Subpart GGGa; however, the equipment is not an affected facility under Subpart VVa.
NSPS 40 CFR 60, Subpart GGG	Leaks of VOC in Petroleum Refineries (Construction, Reconstruction, or Modification Commenced After Jan. 4, 1983 and before to Nov.7, 2006)	Yes	DHT, PLAT, SATS, Sulferox SRU, SWAATS	The group of all equipment (each pump, pressure relief device, open-ended valve or line, valve, compressor, and flange or other connector that is in VOC service), except compressors exempted by 60.593, within a process unit is an affected facility for purposes of this subpart. The performance standards for Subpart GGG are set by Subpart VV. Note: On June 2, 2008, certain provisions (including process unit definition) were stayed until further notice.
NSPS 40 CFR 60, Subpart GGGa	Leaks of VOC in Petroleum Refineries (Construction, Reconstruction, or Modification Commenced After to Nov.7, 2006)	Yes	BENSAT	The group of all equipment (each pump, pressure relief device, open-ended valve or line, valve, compressor, and flange or other connector that is in VOC service), except compressors exempted by 60.593a, within a process unit is an affected facility for purposes of this subpart. The performance standards for Subpart GGGa are set by Subpart VVa. Note: On June 2, 2008, certain provisions (including process unit definition) were stayed until further notice.
NSPS 40 CFR Part 60 Subpart QQQ	VOC Emissions from Petroleum Refineries Waste Water Systems	Yes	WWS (Oil-water separator in WWS, Wastewater tanks in TK-R and TK-L)	The oil/water separator that is part of the Unit WWS is an affected facility for purposes of this subpart. The drain systems for the SATS and DHT are affected facilities subject to requirements under this subpart. In addition, wastewater tanks in TK-R and TK-L are subject to NSPS QQQ since: 1. they are constructed/modified/reconstructed after May 4, 1987; and 2. they meet the NSPS QQQ oil-water separator definition. Tanks T-27 and T-28 are subject to NSPS QQQ as tanks storing oily wastewater and located between individual drain systems and the oil-water

FEDERAL REGU-LATIONS CITATION	Title	Applies? Enter Yes or No	Unit(s) or Facility	JUSTIFICATION:
				separator. However, as NSPS Kb tanks, they will not be subject to the NSPS QQQ oil-water separator standards pursuant to 40 CFR 60.692-3(d).
NSPS 40 CFR Part 60 Subpart IIII	CI Internal Combustion Engines	Yes	AC-12, EG-6, FW-1, FW-2	Units AC-12, EG-6, FW-1, and FW-2 were constructed, modified, or reconstructed on or after July 11, 2005. Unit AC-8 was manufactured in 1974 and was reconstructed before July 11, 2005. Units EG-2, EG-3, EG-4, and Z86-P2 have not been constructed, modified, or reconstructed on or after July 11, 2005. Unit Z-91-DE10 is an emergency fire water pump that was constructed (ordered) after July 11, 2005 and was manufactured prior to 4/106. GEN-1, diesel emergency generator model Volvo 720 GE, trash pumps GR-49 and TP-6, rammer, air compressors 375-1, 375- 2, and 375-3 are non-road, non- stationary reciprocating internal combustion engines as defined in 40 CFR 1068.30 and NSPS subpart IIII does not apply to non-road, non-stationary reciprocating internal combustion engines (see definition of stationary internal combustion engine in 40 CFR 60.4219).
NSPS 40 CFR Part 60 Subpart JJJJ	Stationary Spark Ignition Internal Combustion Engines	No	N/A	Units G-C1A, B and C and P-C1A and B were constructed before June 12, 2006 and have not been modified or reconstructed after June 12, 2006.
NSPS 40 CFR Part 60 Subpart KKKK	Combustion Turbines	No	N/A	Units Z-81-G104 and 105 were constructed before February 18, 2005 and have not been modified or reconstructed after February 18, 2005.
NESHAP 40 CFR 61 Subpart A	General Provisions	Yes	See units subject to 40 CFR 61	See applicability justifications below for 40 CFR 61.
NESHAP 40 CFR 61 Subpart E	National Emission Standards for Mercury	No	N/A	This facility is not a source of mercury emissions.
NESHAP 40 CFR 61 Subpart M	Asbestos	Yes	Entire Facility (potentially)	Does not apply under routine operations, but in the case of demolition, this subpart would apply.
NESHAP 40 CFR 61 Subpart V	National Emission Standards for Equipment Leaks (Fugitive Emission Sources)	No	N/A	There are no sources in VHAP service, as defined by this subpart, at Gallup Refinery.
NESHAP 40 CFR 61 Subpart FF	Benzene Waste Operations	Yes	WWS, Wastewater tanks in TK-R and TK-L	The wastewater collection system, oil/water separator, DGF, and MPPE are affected facilities. In addition, wastewater tanks in TK-R and TK-L can be subject to 40 CFR 61, Subpart FF if they qualify as waste management units used to store waste as defined in 40 CFR 61, Subpart FF. The total facility benzene emissions are currently greater than 10 Mg/yr.
MACT 40 CFR 63, Subpart A	General Provisions	Yes	See units subject to 40 CFR 63	See applicability justifications below for 40 CFR 63.
MACT 40 CFR 63, Subpart CC	Petroleum Refineries	Yes	CT-1, CT-2, FL-1, FUG-R, FUG-L, TK-R,	Gallup Refinery is a major source of HAPs. This MACT applies to process units at the facility as listed in 63.640(c)(1- 5,7), including: (c)(1)- all miscellaneous process vents associated with process units (Group 1 vents are sent to flare, FL-1). (c)(2)- all storage vessels associated with process units (Potential Group 1 storage vessels provided in NSR permit 0633-M11R9) (c)(3)- all waste water streams and treatment operations (these are Group 2

FEDERAL REGU-LATIONS CITATION	Title	Applies? Enter Yes or No	Unit(s) or Facility	JUSTIFICATION:
			TK-L, TRUCK, WWS	streams and operations at the Gallup Refinery). (c)(4)- all equipment leaks from process units. (c)(5)- all gasoline loading racks under SIC 2911 (the unit TRUCK is a Group 1 gasoline loading rack) (c)(7)- all storage vessels and equipment leaks associated with the gasoline loading racks under SIC 2911 (Potential Group 1 storage vessels provided in NSR permit 0633-M11R9) (c)(8)-All heat exchange systems, as defined in this subpart (CT-1 and CT-2)
MACT 40 CFR 63 Subpart UUU	Petroleum Refineries: Catalytic Cracking Units, Catalytic Reforming Units, Sulfur Recovery Units	Yes	FCCU (including FB-1, ESP), FL-1, PLAT	This subpart applies to process vents and bypass lines associated with the FCCU and PLAT units. Pursuant to 65.1562(f)(2) this subpart does not apply to the Sulferox sulfur recovery unit (SRU) and SWAATS (TV-1) unit as follows: ▪ The SWAATS unit "does not recover elemental sulfur" ▪ The Sulferox SRU uses a "modified reaction carried out in a water solution which contains a metal ion capable of oxidizing the sulfur ion into sulfur."
MACT 40 CFR 63 Subpart EEEE	Organic Liquid Distribution (Non-Gasoline)	Yes	TRUCK, RAIL, FL-1	This subpart applies to the units indicated for the following cases: ▪ Rail car loading and unloading of crude oil; Rail car unloading of crude oil; ▪ Rail car unloading of toluene; Rail car loading of naphtha; Truck unloading of crude oil; ▪ Truck unloading of sweet naphtha and sour naphtha; ▪ Loading and unloading of other materials as applicable under MACT EEEE. Pursuant to 40 CFR 63.2346(b) and Table 2 of MACT EEEE, the rail car crude loading activity will require control under MACT EEEE and will be subject to an emission limitation, operating limits, notification, monitoring, recordkeeping, and reporting requirements of MACT EEEE. Pursuant to 40 CFR 63.2338(c)(3), the rail rack is excluded from MACT EEEE when used to conduct maintenance activities, such as stormwater management, liquid removal from tanks for inspections and maintenance, or changeovers to a different liquid stored in a storage tank. Pursuant to 40 CFR 63.2343(a), the rail car unloading and truck unloading listed above do not require control under MACT EEEE and are not subject to any other notification, recordkeeping, or reporting sections in MACT EEEE, including 40 CFR 63.2350(c), except as indicated in 40 CFR 63.2343(a).
MACT 40 CFR 63, Subpart FFFF	Miscellaneous Organic Chemical Manufacturing	No	N/A	No affected facilities. Further, 40 CFR 63.2435(b)(3) excludes process units that are affected sources or are part of affected sources under another subpart of part 63. The refinery has affected sources under 40 CFR 63, Subparts CC, UUU, EEEE, and ZZZZ.

FEDERAL REGU-LATIONS CITATION	Title	Applies? Enter Yes or No	Unit(s) or Facility	JUSTIFICATION:
MACT 40 CFR 63 Subpart ZZZZ	National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines (**RICE MACT**)	Yes	AC-8, EG-2, EG-3, EG-4, EG-6, FW-1, FW-2, GC-1A, GC-1B, GC-1C, PC-1B, Z-86-P2, Z-91-DE10	Emergency generators EG-2, EG-3, EG-4, EG-6 are existing emergency stationary CI RICE each with a site rating of more than 500 hp located at a major source of HAPs. Per 40 CFR 63.6595, they must comply with the applicable emission limitations, operating limitations, and other requirements no later than June 15, 2007. Per 40 CFR 63.6590(b)(3)(iii), they do not have to meet the requirements of 40 CFR 63, Subparts A and ZZZZ, including initial notification. However, per the emergency stationary RICE definition in 40 CFR 63.6675, all emergency stationary RICE must comply with the requirements specified in 40 CFR 63.6640(f) in order to be considered emergency stationary RICE. Emergency fire water pump engines Z91-DE10 and Z-86-P2 and emergency air compressor AC-8 are existing emergency stationary CI engines each with a site rating less than 500 hp located at a major source of HAPS. Per 40 CFR 63.6595, they must comply with the applicable emission limitations, operating limitations, and other requirements no later than May 3, 2013. In addition, per the emergency stationary RICE definition in 40 CFR 63.6675, all emergency stationary RICE must comply with the requirements specified in 40 CFR 63.6640(f) in order to be considered emergency stationary RICE. Based on current AC-8 operations, it is considered an emergency stationary RICE for purposes of MACT ZZZZ as it meets the emergency stationary RICE definition in 40 CFR 63.6675 and complies with the emergency stationary RICE requirements specified in 40 CFR 63.6640(f) (including operation for up to 50 hours per calendar year in non- emergency situations). Emergency air compressor AC-12 is an existing non-emergency stationary CI engine with a site rating less than 500 hp located at a major source of HAPs. Per 40 CFR 63.6595, it must comply with the applicable emissions limitations, operating limitations, and other requirements no later than May 3, 2013. Based on current operations, it is not considered an emergency stationary RICE for purposes of MACT ZZZZ as it meets the emergency stationary RICE definition in 40 CFR 63.6675 but does not comply with all of the emergency stationary RICE requirements specified in 40 CFR 63.6640(f).Specifically, it operates for equal to or more than 50 hours per calendar year in non-emergency situations. Units GC-1A ,1B, 1C and PC-1B are existing non-emergency stationary SI RICE each with a site rating of less than or equal to 500 hp located at a major source of HAP. Per 40 CFR 63.6595, they must comply with the applicable emission limitations, operating limitations, and other requirements no later than October 19, 2013. GEN-1, diesel emergency generator model Volvo 720 GE, trash pumps GR-49 and TP-6, rammer, air compressors 375-1, 375- 2, and 375-3 are non-road, non-stationary reciprocating internal combustion engines and MACT subpart ZZZZ does not apply to non-road, non-stationary reciprocating internal combustion engines located at a major source of hazardous air pollutants.

FEDERAL REGU-LATIONS CITATION	Title	Applies? Enter Yes or No	Unit(s) or Facility	JUSTIFICATION:
MACT 40 CFR 63 Subpart DDDDD	**Industrial, Commercial, and Institutional Boilers and Process Heaters**	Yes	A-H2, C-H1, C-H2, C-H5, D-H1A D-H2, D-H3, H-F1, H-F2, P-H1, P-H2, Z81-B102, Z81-B104, Z81-B105, Z81-B106	The affected source is the collection at a major source of all existing industrial, commercial, and institutional boilers and process heaters within a subcategory as defined in §63.7575. With the exception of FB- 1, all facility boilers and process heaters are existing units designed to burn gas 1 fuels as defined in§ 63.7575 as they burn either natural gas or refinery gas. This collection of existing boilers and process heaters must comply with MACT DDDDD no later than January 31, 2016, at which point the collection will be subject to annual tune-up work practice standards and notification requirements. MACT DDDDD does not apply to CO boiler FB-1 pursuant to 40 CFR 63.7491(h). Specifically, the CO boiler is part of the affected source "the process vent or group of process vents on fluidized catalytic cracking units that are associated with regeneration of the catalyst used in the unit (i.e. the catalyst regeneration flue gas vent)" subject to 40 CFR 63, Subpart UUU (another subpart of 40 CFR 63).
MACT 40 CFR 63 Subpart GGGGG	**Site Remediation**	Yes	Entire Facility	This subpart would apply if a remediation project were undertaken at the Gallup Refinery. Affected sources could include process vents, remediation material management units and equipment leaks.
NESHAP 40 CFR 64	**Compliance Assurance Monitoring**	No	N/A	Gallup Refinery is a Part 70 Title V major source. Facility's truck loading rack (TRUCK) is controlled by a vapor recovery unit (VRU) during loading of materials other than those with low vapor pressure (true vapor pressure less than 0.2 psia) and is potentially subject to this part, but pursuant to 40 CFR 64.2(b)(1)(vi) is exempt because the VRU exhaust stream is equipped with a CEMS as required by the current Title V permit P021-R3. The FCCU is controlled by an ESP, but pursuant to 40 CFR 64.2(b)(1)(i) is exempt from CAM because the FCCU is subject to PM control requirements under 40 CFR 63, Subpart UUU (a regulation under Section 112 of the act). The FCCU is also controlled by replacement CO boiler FB-1 and is potentially subject to this part but, pursuant to 40 CFR 64.2(b)(1)(vi) is exempt because the FCCU exhaust stream is equipped with CEMS as specified by the current Title V permit P021-R3.

FEDERAL REGU-LATIONS CITATION	Title	Applies? Enter Yes or No	Unit(s) or Facility	JUSTIFICATION:
NESHAP 40 CFR 68	**Chemical Accident Prevention**	Yes	Entire Facility	Gallup Refinery is subject to this part: quantities of materials named in this part are inventoried above threshold limits. Gallup has met the requirement of this part with notification of affected status to the EPA, preparation of a risk management plan (RMP) and filing the RMP with the EPA as follows: ▪ Initial submission on 6/20/99 and corrected submission on 07/12/99; approved by EPA on 07/28/99 ▪ Revised corrected submission on 07/25/00; approved by EPA on 07/31/00. ▪ 5-year update submission on 06/18/04; approved by EPA on 07/30/04 ▪ Revised submission to include SWAATS on 05/30/06; approved by EPA on 06/01/06 ▪ Notification of ownership change on 07/11/08; approved by EPA on 07/11/08 ▪ 5-year update submission on 05/28/11. ▪ Revised submission on 11/24/2015 for new PHA conducted for a H2 Skid in the Alky unit. ▪ 5-year renewal was submitted by May 26, 2016.
Title VI – 40 CFR 82 Subpart F	**Protection of Stratospheric Ozone**	Yes	N/A	Western Refining Southwest, Inc. owns appliances containing CFC and is therefore subject to this subpart. However, this subpart imposes no requirements beyond those imposed on any individual or corporate owner of such appliances.
Title IV – Acid Rain 40 CFR 72	**Acid Rain**	N/A	N/A	This facility is not an acid rain source.
Title IV – Acid Rain 40 CFR 73	**Sulfur Dioxide** Allowance Emissions	N/A	N/A	This facility is not an acid rain source.
Title IV – Acid Rain 40 CFR 76	**Acid Rain** Nitrogen Oxides **Emission Reduction Program**	N/A	N/A	This facility is not an acid rain source.

Table 13-A.
Tanks' Applicability
40 CFR 60, Subpart Kb and 40 CFR 63, Subpart CC

Tank no.	NSPS Kb	MACT CC Group 1	MACT CC Group 2
T-7			X
T-8			X
T-27	X		X
T-28	X		X
T-344	X	X	
Tank no.	NSPS Kb	MACT CC Group 1	MACT CC Group 2
T-568[1]			X
T-583			X
T-716[1]			X
SWS-TK1			

[1] T-716 and T-568, which are two ammonium thiosulfate tanks do not store any volatile organic liquids (VOL) and hence, they do not meet the definition of an affected facility for NSPS Kb. These tanks also do not emit any of the HAPs listed in Table 1 of 40 CFR 63, Subpart CC and hence, MACT CC is not applicable to these units.

Table 13-B
Regulated Tanks, Unit TK-R, Owned by Western Refining Southwest, Inc

Tank No.	Date Constructed, Reconstructed, or Modified	Roof Type	Tank Capacity (bbl)	NSPS K1	NSPS Kb1	MACT CC2 Group 1	MACT CC2 Group 2	20.2.383
O.C. Diesel	1957	FX-H	71					
O.C. Gasoline	1957	FX-H	71					
Z-81-T9	1974	FX-H	60					
Z-81-T13	1989	FX-V	11					
Z-81-T14	1989	FX-H	12					
Z-81-T15	1989	FX-H	90					
Fire Pump	1969	FX-H	12					
Z-83-T3	2002	FX-V	238					
T27	1995	IFR	5000		X			X
T28	1995	IFR	5000		X			X
SWS-TK1	2006	FX	931					X
AM-TK1	1984	FX-V	60					
Z84-T35	2010	IFR	27234		X			
Chevron	1965	FX-V	238					
Western	1982	FX-V	238					
Texaco	1989	FX-H8	48					
Conoco	1987	FX-H	24					
Exxon	1974	FX-H	36					
Total	1991	FX-H	190					
Mobil	1993	FX-H	190					
Shell	1963	FX-H	190					
Amoco	1965	FX-H	4					

[1] Tanks marked in these columns have the potential to be subject to NSPS Subpart K or Kb based on construction date and capacity. (Subpart K applies for tanks with construction dates between June 11, 1973 and May 19, 1978 and capacity ≥ 40,000 gal or 952 bbl; Subpart Kb applies for tanks with construction dates after July 23, 1984 and capacity ≥ 75 m3 or 471.7 bbl). Potential NSPS K tanks would only be subject to this Subpart when storing a petroleum liquid as defined in 40 CFR 60.111(b). Potential NSPS Kb tanks with a capacity ≥ 75 m3 but < 151 m3 would only be subject to Subpart Kb when storing a volatile organic liquid as defined in 40 CFR 60.111(b) with a maximum true vapor pressure ≥ 15.0 KPa. Potential NSPS Kb tanks with a capacity ≥ 151 m3 would only be subject to Subpart Kb when storing a volatile organic liquid as defined in 40 CFR 60.111(b) with a maximum true vapor pressure ≥ 3.5 KPa. There are no potential NSPS Subpart Ka tanks at this facility. Pressure vessels (pressurized tanks) are exempt from these regulations. Tanks in wastewater system are subject to BWON and/or NSPS QQQ and may comply with NSPS Kb.
[2] Tanks marked under this column have the potential to be subject to 40 CFR 63, Subpart CC based on having a capacity ≥ 10,567 gallons or 252 bbl. Fixed roof tanks with capacities ≥ 10.567 gallons or 252 bbl and floating roof tanks with capacities ≥ 10,567 gallons or 252 bbl but < 46,758 gallons or 1113 bbl are identified as potential Group 2 storage vessels and floating roof tanks with capacities ≥ 46,758 gallons or 1113 bbl are identified as potential Group 1 storage vessels. Potential Group 2 storage vessels would only be subject to MACT CC Group 2 requirements when storing organic liquids. Potential Group 1 storage vessels would only be subject to MACT CC Group 1 requirements

Table 13-C
Regulated Tanks, Unit TK-L, Owned by Western Refining Terminals, LLC

Tank No.	Date Constructed, Reconstructed, or Modified	Roof Type	Tank Capacity (bbl)	NSPS K[1]	NSPS Kb[1]	MACT CC[2] Group 1	MACT CC[2] Group 2	20.2.38[3]
T-1	1965	FX-V5	3000				X	X
T-2	1965	IFR6	4000			X		X
T-3	1965	IFR	4000			X		X
T-4	1970	IFR	4000			X		X
T-5	1963	FX-V	1802				X	X
T-6	1963	IFR	1800			X		X
T-7	2012	IFR	2000		X	X		X
T-8	2012	IFR	2000				X	X
T-101	1957	IFR	80000			X		X
T-102	1991	EFR7	80000		X	X		X
T-106	1957	FX-V	5000				X	X
T-107	1957	EFR	5000			X		X
T-108	1957	IFR	5000			X		X
T-111	1957	FX-V	5000				X	X
T-112	1957	FX-V	5000				X	X
T-115	1957	FX-V	5000				X	X
T-116	1957	FX-V	5000				X	X
T-225	1957	FX-V	25000				X	X
T-226	1957	FX-V	25000				X	X
T-227	1957	FX-V	5000				X	X
T-228	1957	FX-V	5000				X	X
T-231	1957	IFR	5000				X	X
T-232	1957	IFR	5000				X	X
T-235	1957	IFR	5000				X	X
T-337	1977	IFR	20000	X		X		X
T-338*	1964	IFR	25000		*		X	X
T-342	1957	IFR	5000				X	X
T-343	1957	FX-V	5000				X	X
T-344	2014	EFR	22700		X	X		X
T-345	1977	IFR	20000	X		X		X
T-567	1969	EFR	20000			X		X
T-569	1957	EFR	25000			X		X
T-570	1957	EFR	25000			X		X
T-571	1957	EFR	25000			X		X
T-572	1957	EFR	25000			X		X
T-574	1968	EFR	40000			X		X
T-575	1957	FX-V	8000				X	X

T-576	1968	EFR	40000			X		X
T-577	1957	FX-V	10000				X	X
T-579	1957	FX-V	20000				X	X
T-581	1957	IFR	25000				X	X
T-582	1957	IFR	25000			X		X
T-583	1996	FX-V	55000				X	X
T-701	1963	FX-V	37000				X	X
T-702	1963	FX-V	52,200				X	X
T-703	1963	FX-V	25000				X	X
T-704	1963	FX-V	10000				X	X
T-705	1963	FX-V	10000				X	X
T-706 (minor NSR exempt)	1963	FX-V	10000				X	X
T-707	1963	FX-V	1700				X	X
T-714	1969	FX-V	29000				X	X

[1] Tanks marked in these columns have the potential to be subject to NSPS Subpart K or Kb based on construction date and capacity. (Subpart K applies for tanks with construction dates between June 11, 1973 and May 19, 1978 and capacity ≥ 40,000 gal or 952 bbl; Subpart Kb applies for tanks with construction dates after July 23, 1984 and capacity ≥ 75 m3 or 471.7 bbl). Potential NSPS K tanks would only be subject to this Subpart when storing a petroleum liquid as defined in 40 CFR 60.111(b). Potential NSPS Kb tanks with a capacity ≥ 75 m3 but < 151 m3 would only be subject to Subpart Kb when storing a volatile organic liquid as defined in 40 CFR 60.111(b) with a maximum true vapor pressure ≥ 15.0 KPa. Potential NSPS Kb tanks with a capacity ≥ 151 m3 would only be subject to Subpart Kb when storing a volatile organic liquid as defined in 40 CFR 60.111(b) with a maximum true vapor pressure ≥ 3.5 KPa. There are no potential NSPS Subpart Ka tanks at this facility. Pressure vessels (pressurized tanks) are exempt from these regulations.
[2] Tanks marked under this column have the potential to be subject to 40 CFR 63, Subpart CC based on having a capacity ≥ 10,567 gallons or 252 bbl. Fixed roof tanks with capacities ≥ 10.567 gallons or 252 bbl and floating roof tanks with capacities ≥ 10,567 gallons or 252 bbl but < 46,758 gallons or 1113 bbl are identified as potential Group 2 storage vessels and floating roof tanks with capacities ≥ 46,758 gallons or 1113 bbl are identified as potential Group 1 storage vessels. Potential Group 2 storage vessels would only be subject to MACT CC Group 2 requirements when storing organic liquids. Potential Group 1 storage vessels would only be subject to MACT CC Group 1 requirements when storing an organic liquid with a stored-liquid maximum true vapor pressure ≥ 10.4 kPa and stored-liquid annual average true vapor pressure ≥ 8.3 kPa and annual average HAP liquid concentration > 4 percent by weight total organic HAP. Pressure vessels are exempt from this regulation.
[3] Tanks marked under this column have the potential to be subject to 20.2.38.109 NMAC based on having a capacity≥ 20,000 gallons or 476 bbl. Potential 20.2.38 tanks would only be subject to 20.2.38.109 NMAC when storing hydrocarbon liquids containing hydrogen sulfide at a throughput ≥ 30,000 gallons per week.

[4] FX-V = Fixed Roof, Vertical

[5] IFR = Internal Floating Roof

[6] EFR = External Floating Roof

[7] FX-H = Fixed Roof, Horizontal

Section 14

Operational Plan to Mitigate Emissions

(Submitting under 20.2.70, 20.2.72, 20.2.74 NMAC)

☑ **Title V Sources** (20.2.70 NMAC)**:** By checking this box and certifying this application the permittee certifies that it has developed an **Operational Plan to Mitigate Emissions During Startups, Shutdowns, and Emergencies** defining the measures to be taken to mitigate source emissions during startups, shutdowns, and emergencies as required by 20.2.70.300.D.5(f) and (g) NMAC. This plan shall be kept on site to be made available to the Department upon request. This plan should not be submitted with this application.

☐ **NSR** (20.2.72 NMAC)**, PSD** (20.2.74 NMAC) **& Nonattainment** (20.2.79 NMAC) **Sources:** By checking this box and certifying this application the permittee certifies that it has developed an **Operational Plan to Mitigate Source Emissions During Malfunction, Startup, or Shutdown** defining the measures to be taken to mitigate source emissions during malfunction, startup, or shutdown as required by 20.2.72.203.A.5 NMAC. This plan shall be kept on site to be made available to the Department upon request. This plan should not be submitted with this application.

☑ **Title V** (20.2.70 NMAC)**, NSR** (20.2.72 NMAC)**, PSD** (20.2.74 NMAC) **& Nonattainment** (20.2.79 NMAC) **Sources:** By checking this box and certifying this application the permittee certifies that it has established and implemented a Plan to Minimize Emissions During Routine or Predictable Startup, Shutdown, and Scheduled Maintenance through work practice standards and good air pollution control practices as required by 20.2.7.14.A and B NMAC. This plan shall be kept on site or at the nearest field office to be made available to the Department upon request. This plan should not be submitted with this application.

As stated above, submittal of operational plan to mitigate emissions with this application is not required.

Section 15

Alternative Operating Scenarios

(Submitting under 20.2.70, 20.2.72, 20.2.74 NMAC)

Alternative Operating Scenarios: Provide all information required by the department to define alternative operating scenarios. This includes process, material and product changes; facility emissions information; air pollution control equipment requirements; any applicable requirements; monitoring, recordkeeping, and reporting requirements; and compliance certification requirements. Please ensure applicable Tables in this application are clearly marked to show alternative operating scenario.

Construction Scenarios: When a permit is modified authorizing new construction to an existing facility, NMED includes a condition to clearly address which permit condition(s) (from the previous permit and the new permit) govern during the interval between the date of issuance of the modification permit and the completion of construction of the modification(s). There are many possible variables that need to be addressed such as: Is simultaneous operation of the old and new units permitted and, if so for example, for how long and under what restraints? In general, these types of requirements will be addressed in Section A100 of the permit, but additional requirements may be added elsewhere. Look in A100 of our NSR and/or TV permit template for sample language dealing with these requirements. Find these permit templates at: https://www.env.nm.gov/aqb/permit/aqb_pol.html. Compliance with standards must be maintained during construction, which should not usually be a problem unless simultaneous operation of old and new equipment is requested.

In this section, under the bolded title "Construction Scenarios", specify any information necessary to write these conditions, such as: conservative-realistic estimated time for completion of construction of the various units, whether simultaneous operation of old and new units is being requested (and, if so, modeled), whether the old units will be removed or decommissioned, any PSD ramifications, any temporary limits requested during phased construction, whether any increase in emissions is being requested as SSM emissions or will instead be handled as a separate Construction Scenario (with corresponding emission limits and conditions, etc.

N/A – No alternative operating scenarios included with this Title V renewal application.

Section 16

Air Dispersion Modeling

1) Minor Source Construction (20.2.72 NMAC) and Prevention of Significant Deterioration (PSD) (20.2.74 NMAC) ambient impact analysis (modeling): Provide an ambient impact analysis as required at 20.2.72.203.A(4) and/or 20.2.74.303 NMAC and as outlined in the Air Quality Bureau's Dispersion Modeling Guidelines found on the Planning Section's modeling website. If air dispersion modeling has been waived for one or more pollutants, attach the AQB Modeling Section modeling waiver approval documentation.
2) SSM Modeling: Applicants must conduct dispersion modeling for the total short-term emissions during routine or predictable startup, shutdown, or maintenance (SSM) using realistic worst-case scenarios following guidance from the Air Quality Bureau's dispersion modeling section. Refer to "Guidance for Submittal of Startup, Shutdown, Maintenance Emissions in Permit Applications (http://www.env.nm.gov/aqb/permit/app_form.html) for more detailed instructions on SSM emissions modeling requirements.
3) Title V (20.2.70 NMAC) ambient impact analysis: Title V applications must specify the construction permit and/or Title V Permit number(s) for which air quality dispersion modeling was last approved. Facilities that have only a Title V permit, such as landfills and air curtain incinerators, are subject to the same modeling required for preconstruction permits required by 20.2.72 and 20.2.74 NMAC.

What is the purpose of this application?	Enter an X for each purpose that applies
New PSD major source or PSD major modification (20.2.74 NMAC). See #1 above.	
New Minor Source or significant permit revision under 20.2.72 NMAC (20.2.72.219.D NMAC). See #1 above. **Note:** Neither modeling nor a modeling waiver is required for VOC emissions.	
Reporting existing pollutants that were not previously reported.	
Reporting existing pollutants where the ambient impact is being addressed for the first time.	
Title V application (new, renewal, significant, or minor modification. 20.2.70 NMAC). See #3 above.	**X**
Relocation (20.2.72.202.B.4 or 72.202.D.3.c NMAC)	
Minor Source Technical Permit Revision 20.2.72.219.B.1.d.vi NMAC for like-kind unit replacements.	
Other: i.e. SSM modeling. See #2 above.	
This application does not require modeling since this is a No Permit Required (NPR) application.	
This application does not require modeling since this is a Notice of Intent (NOI) application (20.2.73 NMAC).	
This application does not require modeling according to 20.2.70.7.E(11), 20.2.72.203.A(4), 20.2.74.303, 20.2.79.109.D NMAC and in accordance with the Air Quality Bureau's Modeling Guidelines.	**X**

Check each box that applies:

☐ See attached, approved modeling **waiver for all** pollutants from the facility.
☐ See attached, approved modeling **waiver for some** pollutants from the facility.
☐ Attached in Universal Application Form 4 (UA4) is a **modeling report for all** pollutants from the facility.
☐ Attached in UA4 is a **modeling report for some** pollutants from the facility.
☑ No modeling is required

No modeling is required for this permitting action. Air dispersion modeling was provided in the 0633-M15 and 0633-M17 Significant Revision applications.

Section 17

Compliance Test History

(Submitting under 20.2.70, 20.2.72, 20.2.74 NMAC)

To show compliance with existing NSR permits conditions, you must submit a compliance test history.

Compliance Test History Table

Unit	Type	Method	Pollutants	Test Date	Reason for Test
FCCU/ESP	PM control device for FCCU	EPA Methods 1-4,5,7E,201A,202	PM	11/28/2018	Initial Compliance Test
FCCU/ESP	PM control device for FCCU	EPA Methods 1,2,3,3A,4,7E,10	PM	7/10/2018	Permit Requirement, ASFO, MACT UUU
FCCU/ESP	PM control device for FCCU	EPA Methods 1,2,3,3A,4,7E,10	PM	5/9/2017	Permit Requirement, ASFO, MACT UUU
FCCU/ESP	PM control device for FCCU	EPA Methods 1,2,3,3A,4,7E,10	PM	2/28/2017	Permit Requirement, ASFO, MACT UUU
FCCU/ESP	PM control device for FCCU	EPA Methods 1,2,3,3A,4,7E,11	PM	1/18/2017	Permit Requirement, ASFO, MACT UUU
FCCU/ESP	PM control device for FCCU	EPA Methods 1,2,3,3A,4,7E,10	PM	2/9/2016	Permit Requirement, ASFO, MACT UUU
FCCU/ESP	PM control device for FCCU	EPA Methods 1,2,3,3A,4,7E,10	PM	6/9/2015-6/10/2015	Permit Requirement, ASFO, MACT UUU
FCCU/ESP	PM control device for FCCU	EPA Methods 1, 2,3, 4, 5B	PM	2/9/2015-2/11/2015	stipulated final order requirement & permit requirement
FCCU/ESP	PM control device for FCCU	EPA Methods 1, 2,3, 4, 5B	PM	3/4/2014	stipulated final order requirement & permit requirement
FCCU/ESP	PM control device for FCCU	EPA Methods 1, 2,3, 4, 5B	PM	12/20&21/2012	stipulated final order requirement & initial permit requirement
FCCU/ESP	FCCU/ESP	FCCU/ESP	FCCU/ESP	FCCU/ESP	FCCU/ESP
FCCU/ESP	FCCU/ESP	FCCU/ESP	FCCU/ESP	FCCU/ESP	FCCU/ESP
Z-81-B102	boiler	EPA Methods 3A,7E,10	NO_X, CO	10/9/2018	Permit Requirement

Unit	Type	Method	Pollutants	Test Date	Reason for Test
Z-81-B102	boiler	EPA Methods 3A,7E,10	NO_X, CO	10/8/2017	Permit Requirement
Z-81-B102	boiler	EPA Methods 3A,7E,10	NO_X, CO	7/14/2016	Permit Requirement
Z-81-B102	boiler	EPA Methods 3A,7E,10	NO_X, CO	7/16/2015	Permit Requirement
Z-81-B102	boiler	EPA Methods 7E, 10	NOx, CO	12/28/2010	Permit Requirement
Z-81-B102	boiler	EPA Methods 3A, 7E, 19	NOx	7/2006	stipulated final order requirement
Z-81-B104	boiler	EPA Methods 3A,7E,10	NO_X, CO	4/11/2018	Permit Requirement
Z-81-B104	boiler	EPA Methods 3A,7E,10	NO_X, CO	4/10/2017	Permit Requirement
Z-81-B104	boiler	EPA Methods 3A,7E,10	NO_X, CO	7/12/2016	Permit Requirement
Z-81-B104	boiler	EPA Methods 3A,7E,10	NO_X, CO	7/14/2015	Permit Requirement
Z-81-B104	boiler	EPA Methods 7E, 10	NOx, CO	04/15/2010	Permit Requirement
Z-81-B104/G104	cogen	EPA Methods 10, 20	NOx, CO	8/1993	Initial Permit Requirement
Z-81-B105	boiler	EPA Methods 3A,7E,10	NO_X, CO	4/10/2018	Permit Requirement
Z-81-B105	boiler	EPA Methods 3A,7E,10	NO_X, CO	4/10/2017	Permit Requirement
Z-81-B105	boiler	EPA Methods 3A,7E,10	NO_X, CO	7/13/2016	Permit Requirement
Z-81-B105	boiler	EPA Methods 3A,7E,10	NO_X, CO	7/14/2015	Permit Requirement
Z-81-B105	boiler	EPA Methods 7E, 10	NOx, CO	12/9/2009	Permit Requirement
Z-81-B105/G105	cogen	EPA Methods 10, 20	NOx, CO	8/1993	Initial Permit Requirement

Unit	Type	Method	Pollutants	Test Date	Reason for Test
Z-81-B106	boiler	EPA Methods 3A,7E,10	NO_X, CO	4/10/2018	Permit Requirement
Z-81-B106	boiler	EPA Methods 3A,7E,10	NO_X, CO	4/10/2017	Permit Requirement
Z-81-B106	boiler	EPA Methods 3A,7E,10	NO_X, CO	7/13/2016	Permit Requirement
Z-81-B106	boiler	EPA Methods 3A,7E,10	NO_X, CO	8/25/2015	Permit Requirement
Z-81-B106	boiler	EPA Methods 7E, 10	NOx, CO	12/29/2010	Permit Requirement
Z-81-B106	boiler	EPA Methods 3A, 7E, 19	NOx	10/2007	stipulated final order requirement
Z-81-B106	boiler	EPA Methods 7E, 10	NOx, CO	10/1999	Initial Permit Requirement
F-B1 (Replacement)	replacement CO boiler for FCCU	EPA Methods 1, 2, 3A, 4, 7E, 10	NOx, CO	12/06/2012	Initial Permit Requirement (Initial compliance test for replacement F-B1)
F-B1	CO boiler for FCCU	EPA Methods 7E, 10	NOx, CO	12/7/2007	Permit Requirement
F-B1	CO boiler for FCCU	EPA Methods 29, 10	Ni, CO	4/2005	Permit Requirement & 40 CFR 63, Subpart UUU
G-C1A	engine	EPA Methods 1,2,3,3A,4,7E,10	NO_X, CO	4/4/2018	Permit Requirement, MACT ZZZZ
G-C1A	engine	EPA Methods 1,2,3,3A,4,7E,10	NO_X, CO	3/14/2017	Permit Requirement, MACT ZZZZ
G-C1A	engine	EPA Methods 1,2,3,3A,4,7E,10	NO_X, CO	2/11/2016	Permit Requirement, MACT ZZZZ
G-C1A	engine	EPA Methods 1,2,3,3A,4,7E,10	NO_X, CO	3/17/2015	Permit Requirement, MACT ZZZZ
G-C1A	engine	EPA Methods 1, 2, 3A, 4, 7E, 10	NOx, CO	4/2-4/2014	Permit Requirement
G-C1A	engine	EPA Methods 1, 2, 3A, 4, 7E, 10	NOx, CO	04/16/2013	Permit Requirement
G-C1A	engine	EPA Methods 7E, 10	NOx, CO	6/7/2012	Permit Requirement

Unit	Type	Method	Pollutants	Test Date	Reason for Test
G-C1A	engine	Portable Analyzer	NOx, CO	7/20/2011; 6/9/2010	Permit Requirement
G-C1A	engine	EPA Methods 1, 2, 3A, 4, 7E, 10	NOx, CO	4/2-4/2014	Permit Requirement
G-C1A	engine	EPA Methods 1, 2, 3A, 4, 7E, 10	NOx, CO	04/16/2013	Permit Requirement
G-C1B	engine	EPA Methods 1,2,3,3A,4,7E,10	NO_X, CO	4/4/2018	Permit Requirement, MACT ZZZZ
G-C1B	engine	EPA Methods 1,2,3,3A,4,7E,10	NO_X, CO	3/2/2017	Permit Requirement, MACT ZZZZ
G-C1B	engine	EPA Methods 1,2,3,3A,4,7E,10	NO_X, CO	2/11/2016	Permit requirement, MACT ZZZZ
G-C1B	engine	EPA Methods 1,2,3,3A,4,7E,10	NO_X, CO	3/17/2015	Permit Requirement, MACT ZZZZ
G-C1B	engine	EPA Methods 7E, 10	NOx, CO	6/7/2012	Permit Requirement
G-C1B	engine	Portable Analyzer	NOx, CO	7/19&20/2011; 6/9/2010	Permit Requirement
G-C1C	engine	EPA Methods 1,2,3,3A,4,7E,10	NO_X, CO	4/3/2018	Permit Requirement, MACT ZZZZ
G-C1C	engine	EPA Methods 1,2,3,3A,4,7E,10	NO_X, CO	3/2/2017	Permit Requirement, MACT ZZZZ
G-C1C	engine	EPA Methods 1,2,3,3A,4,7E,10	NO_X, CO	2/10/2016	Permit Requirement, MACT ZZZZ
G-C1C	engine	EPA Methods 1,2,3,3A,4,7E,10	NO_X, CO	3/18/2015	Permit Requirement, MACT ZZZZ
G-C1C	engine	EPA Methods 1, 2, 3A, 4, 7E, 10	NOx, CO	4/2-4/2014	Permit Requirement
G-C1C	engine	EPA Methods 1, 2, 3A, 4, 7E, 10	NOx, CO	04/16/2013	Permit Requirement
G-C1C	engine	EPA Methods 7E, 10	NOx, CO	6/26/2012	Permit Requirement
G-C1C	engine	Portable Analyzer	NOx, CO	7/20/2011; 6/0/2010	Permit Requirement

Unit	Type	Method	Pollutants	Test Date	Reason for Test
P-C1A	engine	EPA Methods 1, 2, 3A, 4, 7E, 10	NOx, CO	04/18/2013	Permit Requirement
P-C1A	engine	EPA Methods 7E, 10	NOx, CO	6/5/2012	Permit Requirement
P-C1A	engine	Portable Analyzer	NOx, CO	7/19/2011; 7/23/2010	Permit Requirement
P-C1B	engine	EPA Methods 1,2,3,3A,4,7E,10	NO_X, CO	4/5/2018	Permit Requirement, MACT ZZZZ
P-C1B	engine	EPA Methods 1,2,3,3A,4,7E,10	NO_X, CO	3/1/2017	Permit Requirement, MACT ZZZZ
P-C1B	engine	EPA Methods 1,2,3,3A,4,7E,10	NO_X, CO	3/31/2016	Permit Requirement, MACT ZZZZ
P-C1B	engine	EPA Methods 1,2,3,3A,4,7E,10	NO_X, CO	3/4/2015	Permit Requirement, MACT ZZZZ
P-C1B	engine	EPA Methods 1, 2, 3A, 4, 7E, 10	NOx, CO	4/13/2014	Permit Requirement
P-C1B	engine	EPA Methods 1, 2, 3A, 4, 7E, 10	NOx, CO	04/19/2013	Permit Requirement
P-C1B	engine	EPA Methods 7E, 10	NOx, CO	6/8/2012	Permit Requirement
P-C1B	engine	Portable Analyzer	NOx, CO	3/10/2011; 9/21/10; 7/15-16/10	Permit Requirement
A-H2	heater	EPA Methods 3A,7E,10	NO_X, CO	11/13/2018	Permit Requirement
A-H2	heater	EPA Methods 3A,7E,10	NO_X, CO	9/24/2017	Permit Requirement
A-H2	heater	EPA Methods 3A,7E,10	NO_X, CO	11/7/2016	Permit Requirement
A-H2	heater	EPA Methods 3A,7E,10	NO_X, CO	12/15/2015	Permit Requirement
C-H1	heater	EPA Methods 3A,7E,10	NO_X, CO	4/11/2018	Permit Requirement
C-H1	heater	EPA Methods 3A,7E,10	NO_X, CO	4/10/2017	Permit Requirement

Unit	Type	Method	Pollutants	Test Date	Reason for Test
C-H1	heater	EPA Methods 3A,7E,10	NO_X, CO	7/26/2016	Permit Requirement
C-H1	heater	EPA Methods 3A,7E,10	NO_X, CO	12/16/2015	Permit Requirement
C-H1	heater	EPA Methods 7E, 10	NOx, CO	11/7/2012; 9/21/2009	Permit Requirement
C-H1	heater	EPA Methods 3A, 7E, 19	NOx	12/2006	stipulated final order requirement
C-H2	heater	EPA Methods 3A,7E,10	NO_X, CO	11/14/2018	Permit Requirement
C-H2	heater	EPA Methods 3A,7E,10		9/24/2017	Permit Requirement
C-H2	heater	EPA Methods 3A,7E,10	NO_X, CO	11/7/2016	Permit Requirement
C-H2	heater	EPA Methods 3A,7E,10	NO_X, CO	12/17/2015	Permit Requirement
C-H2	heater	EPA Methods 7E, 10	NOx, CO	11/8/2012; 9/21/2009	Permit Requirement
C-H2	heater	EPA Methods 3A, 7E, 19	NOx	12/2006	stipulated final order requirement
C-H5	heater	EPA Methods 3A,7E,10	NO_X, CO	11/12/2018	Permit Requirement
C-H5	heater	EPA Methods 3A,7E,10	NO_X, CO	9/24/2017	Permit Requirement
C-H5	heater	EPA Methods 3A,7E,10	NO_X, CO	11/8/2016	Permit Requirement
C-H5	heater	EPA Methods 3A,7E,10	NO_X, CO	9/23/2015	Permit Requirement
C-H5	heater	EPA Methods 7E, 10	NOx, CO	11/8/2012 – 11/9/2012; 12/9/2009	Permit Requirement
H-F1	heater	EPA Methods 3A,7E,10	NO_X, CO	11/1/2018	Permit Requirement
H-F1	heater	EPA Methods 3A,7E,10	NO_X, CO	10/8/2017	Permit Requirement

Unit	Type	Method	Pollutants	Test Date	Reason for Test
H-F1	heater	EPA Methods 3A,7E,10	NO_X, CO	10/11/2016	Permit Requirement
H-F1	heater	EPA Methods 3A,7E,10	NO_X, CO	9/23/2015	Permit Requirement
H-F1	heater	N/A	N/A	N/A	no test requirement in current NSR permit or Title V permit
H-F2	heater	EPA Methods 3A,7E,10	NO_X, CO	11/1/2018	Permit Requirement
H-F2	heater	EPA Methods 3A,7E,10	NO_X, CO	10/8/2017	Permit Requirement
H-F2	heater	EPA Methods 3A,7E,10	NO_X, CO	10/12/2016	Permit Requirement
H-F2	heater	EPA Methods 3A,7E,10	NO_X, CO	9/23/2015	Permit Requirement
H-F2	heater	N/A	N/A	N/A	no test requirement in current NSR permit or Title V permit
P-H1	heater	EPA Methods 3A,7E,10	NO_X, CO	11/15/2018	Permit Requirement
P-H1	heater	EPA Methods 3A,7E,10	NO_X, CO	9/24/2017	Permit Requirement
P-H1	heater	EPA Methods 3A,7E,10	NO_X, CO	11/8/2016	Permit Requirement
P-H1	heater	EPA Methods 3A,7E,10	NO_X, CO	9/22/2015	Permit Requirement
P-H1	heater	EPA Methods 3A, 7E, 10	NOx, CO	12/21/2012	Initial Permit Requirement
P-H2	heater	EPA Methods 3A,7E,10	NO_X, CO	11/15/2018	Permit Requirement
P-H2	heater	EPA Methods 3A,7E,10	NO_X, CO	9/24/2017	Permit Requirement
P-H2	heater	EPA Methods 3A,7E,10	NO_X, CO	11/9/2016	Permit Requirement
P-H2	heater	EPA Methods 3A,7E,10	NO_X, CO	9/22/2015	Permit Requirement

Unit	Type	Method	Pollutants	Test Date	Reason for Test
P-H2	heater	EPA Methods 7E, 10	NOx, CO	2/19/2010	Permit Requirement
P-H2	heater	EPA Methods 7E, 10	NOx, CO	10/1998	Initial Permit Requirement
P-H2	heater	N/A	N/A	N/A	no test requirement in current NSR permit or Title V permit
D-H1A	heater	N/A	N/A	N/A	no test requirement in current NSR permit or Title V permit
D-H2	heater	N/A	N/A	N/A	no test requirement in current NSR permit or Title V permit
D-H3	heater	N/A	N/A	N/A	no test requirement in current NSR permit or Title V permit
FL-1	flare	EPA Methods 18, 22	visible emissions; velocity, BTU/scf	11/6/2012; 1/2012; 5/2011; 5/2000	Permit Requirement & 40 CFR 60, Subpart A
Truck Rack (VRU)	truck rack	EPA Methods 2A, 21, 25B	VOC	5/1999	Permit Requirement
TV-1	SWAATS sulfur recovery unit	EPA Methods 3A, 6C, 2 and 4	SO_2	10/2007	Initial Permit Requirement

Section 19

Requirements for Title V Program

Do not print this section unless this is a Title V application.

Who Must Use this Attachment:

* Any major source as defined in 20.2.70 NMAC.
* Any source, including an area source, subject to a standard or other requirement promulgated under Section 111 - Standards of Performance for New Stationary Sources, or Section 112 Hazardous Air Pollutants, of the 1990 federal Clean Air Act ("federal Act"). Non-major sources subject to Sections 111 or 112 of the federal Act are exempt from the obligation to obtain an 20.2.70 NMAC operating permit until such time that the EPA Administrator completes rulemakings that require such sources to obtain operating permits. In addition, sources that would be required to obtain an operating permit solely because they are subject to regulations or requirements under Section 112(r) of the federal Act are exempt from the requirement to obtain an Operating Permit.
* Any Acid Rain source as defined under title IV of the federal Act. The Acid Rain program has additional forms. See http://www.env.nm.gov/aqb/index.html. Sources that are subject to both the Title V and Acid Rain regulations are encouraged to submit both applications simultaneously.
* Any source in a source category designated by the EPA Administrator ("Administrator"), in whole or in part, by regulation, after notice and comment.

19.1 - 40 CFR 64, Compliance Assurance Monitoring (CAM) (20.2.70.300.D.10.e NMAC)

Any source subject to 40CFR, Part 64 (Compliance Assurance Monitoring) must submit all the information required by section 64.7 with the operating permit application. The applicant must prepare a separate section of the application package for this purpose; if the information is already listed elsewhere in the application package, make reference to that location. Facilities not subject to Part 64 are invited to submit periodic monitoring protocols with the application to help the AQB to comply with 20.2.70 NMAC. Sources subject to 40 CFR Part 64, must submit a statement indicating your source's compliance status with any enhanced monitoring and compliance certification requirements of the federal Act.

Not applicable as facility is not subject to 40 CFR 64 (CAM).

The facility's truck loading rack (TRUCK) is controlled by a vapor recovery unit (VRU) during loading of materials other than those with low vapor pressure (true vapor pressure less than 0.2 psia) and is potentially subject to CAM, but pursuant to 40 CFR 64.2(b)(1)(vi) is exempt because the VRU exhaust stream is equipped with a CEMS as required by the current Title V permit P021-R3.

The FCCU is controlled by an ESP, but pursuant to 40 CFR 64.2(b)(1)(i) is exempt from CAM because the FCCU is subject to PM control requirements under 40 CFR 63, Subpart UUU (a regulation under Section 112 of the act).

The FCCU is also controlled by CO boiler FB-1 and is potentially subject to CAM, but pursuant to 40 CFR 64.2(b)(1)(vi) is exempt because the FCCU exhaust stream is equipped with CEMS as specified by the current Title V permit P021-R3.

19.2 - Compliance Status (20.2.70.300.D.10.a & 10.b NMAC)

Describe the facility's compliance status with each applicable requirement at the time this permit application is submitted. This statement should include descriptions of or references to all methods used for determining compliance. This statement should include descriptions of monitoring, recordkeeping and reporting requirements and test methods used to determine compliance with all applicable requirements. Refer to Section 2, Tables 2-N and 2-O of the Application Form as necessary. (20.2.70.300.D.11 NMAC) For facilities with existing Title V permits, refer to most recent Compliance Certification for existing requirements. Address new requirements such as CAM, here, including steps being taken to achieve compliance.

Based on information and belief formed after reasonable inquiry, Western believes that the Gallup Refinery is in compliance with each applicable requirement identified in Section 13. In the event that Western should discover new information affecting the compliance status of the facility, Western will make appropriate notifications and/or take corrective actions.

Pursuant to Condition A109B. of Permit **P021-R3**, Western has certified to compliance with the terms and conditions of that permit. The most recent such certification was submitted by the January 31st, 2018 deadline given in P021-R3 (issued 10/16/17). Since that time, Western has continued to be in compliance with applicable requirements as described in Section 13.

19.3 - Continued Compliance (20.2.70.300.D.10.c NMAC)

Provide a statement that your facility will continue to be in compliance with requirements for which it is in compliance at the time of permit application. This statement must also include a commitment to comply with other applicable requirements as they come into effect during the permit term. This compliance must occur in a timely manner or be consistent with such schedule expressly required by the applicable requirement.

The facility will continue to be in compliance with requirements for which it is in compliance at the time of this permit application and will comply with other applicable requirements as they come into effect during the permit term.

19.4 - Schedule for Submission of Compliance (20.2.70.300.D.10.d NMAC)

You must provide a proposed schedule for submission to the department of compliance certifications during the permit term. This certification must be submitted annually unless the applicable requirement or the department specifies a more frequent period. A sample form for these certifications will be attached to the permit.

Compliance certification will be submitted annually, as required by Title V Permit P021-R3, Condition A109B.

19.5 - Stratospheric Ozone and Climate Protection

In addition to completing the four (4) questions below, you must submit a statement indicating your source's compliance status with requirements of Title VI, Section 608 (National Recycling and Emissions Reduction Program) and Section 609 (Servicing of Motor Vehicle Air Conditioners).

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1. Does your facility have any air conditioners or refrigeration equipment that uses CFCs, HCFCs or other ozone-depleting substances? ☒ **Yes** ☐ **No**
2. Does any air conditioner(s) or any piece(s) of refrigeration equipment contain a refrigeration charge greater than 50 lbs? ☐ **Yes** ☒ **No**

   (If the answer is yes, describe the type of equipment and how many units are at the facility.)
3. Do your facility personnel maintain, service, repair, or dispose of any motor vehicle air conditioners (MVACs) or appliances ("appliance" and "MVAC" as defined at 82. 152)? ☐ **Yes** ☒ **No**
4. Cite and describe which Title VI requirements are applicable to your facility (i.e. 40 CFR Part 82, Subpart A through G.)

No 40 CFR 82 requirements apply to this facility.

19.6 - Compliance Plan and Schedule

Applications for sources, which are not in compliance with all applicable requirements at the time the permit application is submitted to the department, must include a proposed compliance plan as part of the permit application package. This plan shall include the information requested below:

A. Description of Compliance Status: (20.2.70.300.D.11.a NMAC)
A narrative description of your facility's compliance status with respect to all applicable requirements (as defined in 20.2.70 NMAC) at the time this permit application is submitted to the department.

B. Compliance plan: (20.2.70.300.D.11.B NMAC)
A narrative description of the means by which your facility will achieve compliance with applicable requirements with which it is not in compliance at the time you submit your permit application package.

C. Compliance schedule: (20.2.70.300D.11.c NMAC)
A schedule of remedial measures that you plan to take, including an enforceable sequence of actions with milestones, which will lead to compliance with all applicable requirements for your source. This schedule of compliance must be at least as stringent as that contained in any consent decree or administrative order to which your source is subject. The obligations of any consent decree or administrative order are not in any way diminished by the schedule of compliance.

D. Schedule of Certified Progress Reports: (20.2.70.300.D.11.d NMAC)
A proposed schedule for submission to the department of certified progress reports must also be included in the compliance schedule. The proposed schedule must call for these reports to be submitted at least every six (6) months.

E. Acid Rain Sources: (20.2.70.300.D.11.e NMAC)
If your source is an acid rain source as defined by EPA, the following applies to you. For the portion of your acid rain source subject to the acid rain provisions of title IV of the federal Act, the compliance plan must also include any additional requirements under the acid rain provisions of title IV of the federal Act. Some requirements of title IV regarding the schedule and methods the source will use to achieve compliance with the acid rain emissions limitations may supersede the requirements of title V and 20.2.70 NMAC. You will need to consult with the Air Quality Bureau permitting staff concerning how to properly meet this requirement.

NOTE: The Acid Rain program has additional forms. See http://www.env.nm.gov/aqb/index.html. Sources that are subject to both the Title V and Acid Rain regulations are **encouraged** to submit both applications **simultaneously**.

No compliance plan required.

19.7 - 112(r) Risk Management Plan (RMP)

Any major sources subject to section 112(r) of the Clean Air Act must list all substances that cause the source to be subject to section 112(r) in the application. The permittee must state when the RMP was submitted to and approved by EPA.

5-year update submission on 05/25/2016.

19.8 - Distance to Other States, Bernalillo, Indian Tribes and Pueblos

Will the property on which the facility is proposed to be constructed or operated be closer than 80 km (50 miles) from other states, local pollution control programs, and Indian tribes and pueblos (20.2.70.402.A.2 and 20.2.70.7.B NMAC)?

(If the answer is yes, state which apply and provide the distances.)

Yes, Arizona state line, 60 km.

19.9 - Responsible Official

Provide the Responsible Official as defined in 20.2.70.7.AD NMAC: Robert S. Hanks, Vice President

Section 20

Other Relevant Information

<u>Other relevant information</u>. Use this attachment to clarify any part in the application that you think needs explaining. Reference the section, table, column, and/or field. Include any additional text, tables, calculations or clarifying information.

Additionally, the applicant may propose specific permit language for AQB consideration. In the case of a revision to an existing permit, the applicant should provide the old language and the new language in track changes format to highlight the proposed changes. If proposing language for a new facility or language for a new unit, submit the proposed operating condition(s), along with the associated monitoring, recordkeeping, and reporting conditions. In either case, please limit the proposed language to the affected portion of the permit.

No other relevant information is being submitted as part of this Title V renewal application package.

Section 22: Certification

Company Name: Western Refining Southwest, Inc.

I, Robert S. Hanks, hereby certify that the information and data submitted in this application are true and as accurate as possible, to the best of my knowledge and professional expertise and experience.

Signed this 22nd day of March, 2019, upon my oath or affirmation, before a notary of the State of

New mexico.

Robert S. Hanks
*Signature

3-22-19
Date

Robert S. Hanks
Printed Name

General Manager
Title

Scribed and sworn before me on this 22nd day of March, 2019.

My authorization as a notary of the State of New mexico expires on the

14th day of april, 2019.

Notary's Signature

3/22/2019
Date

Savannah S. Morgan
Notary's Printed Name

*For Title V applications, the signature must be of the Responsible Official as defined in 20.2.70.7.AE NMAC.